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Pratt and Whitney Aircraft Group
West Palm Beach, Florida

November 1976

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F100 MULTIVARIABLE CONTROL SYSTEM ENGINE MODELS /DESIGN CRITERIA

PRATT & WHITNEY AIRCRAFT GROUP
GOVERNMENT PRODUCTS DIVISION
UNITED TECHNOLOGIES CORPORATION
P.O. BOX 2691
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AIR FORCE AERO-PROPULSION LABORATORY
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This report has been reviewed by the Information Office (ASD/OIP) and is releasable to the National Technical Information Service (NTIS). At NTIS, it will available to the general public, including foreign nations.

This technical report has been reviewed and is approved for publication.

Lester L. Small

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FOR THE COMMANDER

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The objective of the F100 multivariable Control research program is to extend the linear quadratic regulator (LQR) theory to develop a "practical" control system that can operate a state-of-the-art gas turbine engine over its entire flight envelope. The engine selected for this program is a Pratt & Whitney Aircraft F100 afterburning turbofan. To determine the adequacy of the control synthesis effort, the resulting control logic will be incorporated into a digital computer/controller, which then will be used to control a F100 engine in an altitude test

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered) facility at NASA Lewis Research Center. The F100 engine computer simulations, the control criteria for defining the basic requirements of a F100 control system, and a brief evaluation of the resulting LQR engine control system are presented in this report.

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INTRODUCTION AND SUMMARY

INTRODUCTION

Aircraft turbine engines have increased in complexity in recent years, and the engine cycles now being evaluated for future applications are even more complex. The older generation of engines in use today are basically fixed-geometry designs with only fuel flow and perhaps nozzle area as variables. Newer engines, like the Pratt & Whitney Aircraft F100, use variable geometry in the fan and/or compressor stators. Future engines, the so-called variable cycle engines, may also have variable turbine geometry.

The trend toward more complex engines has resulted in additional requirements for the control system. Control systems for older engines required the measurement of three or four parameters and the control of only one or two variables. Controls for future engines will require the measurement of many parameters (perhaps 10 to 20) to control a significant number of engine variables, (perhaps 6 to 10). Operational requirements have also become more stringent, necessitating increased control system capability in terms of accuracy and response. The use of closed-loop control to give better operation of the engine in accordance with performance and limiting requirements is replacing the scheduling type (open loop) controls used on older engines.

Classical control design techniques, which involve the evaluation of each controlling loop individually, have worked well for older, simpler engines. However, such techniques are cumbersome and time-consuming when applied to variable cycle-type engines; therefore, optimal control techniques using modern control theory are now being investigated. The linear quadratic regulator (LQR) is one specific area of modern control theory that appears to be suited to the engine control problem due to the emphasis on maintaining "optimum" engine performance in the presence of a wide variety of external disturbances (i.e., aircraft maneuvers, horsepower, and bleed extractions, etc.) and the requirement for fast engine power transients.

The objective of the F100 multivariable control research program is to extend the LQR theory to develop a "practical" control system that can operate a state-of-the-art gas turbine engine over its entire flight envelope. The engine selected for this program is a Pratt & Whitney Aircraft F100 afterburning turbofan. To determine the adequacy of the control synthesis effort, the resulting control logic will be incorporated into a digital computer/controller. This controller will then be evaluated in conjunction with a hybrid engine simulation. If successful, F100 engine tests will be conducted at a NASA Lewis Research Center altitude test facility.

SUMMARY

The Air Force Aero Propulsion Laboratory and NASA Lewis Research Center have jointly sponsored this control development and evaluation effort. NASA Lewis will provide the digital computer/controller, engine hardware interfaces, the hybrid computer real-time engine simulation, engine altitude test facilities, and engineering manpower to fully evaluate the LQR control system. The Air Force provided contracts for two supporting contractors: Pratt & Whitney Aircraft, an engine manufacturer, and Systems Control, Inc. (Vt), a control research organization. These contractors, although separately funded, have integrated their efforts as outlined in Figure 1 to develop and evaluate a control system for the F100 engine using a modern control approach.

Pratt & Whitney Aircraft had prime responsibility to define the F100 engine via digital computer simulations, to assist NASA Lewis in establishing the necessary engine/computer interface hardware, to establish control criteria, to define the basic requirements of a F100 control system, and, in conjunction with the control contractor, to support the Government in their evaluation of the LQR engine control system.

Systems Control, Inc., had prime responsibility to develop the LQR control logic and demonstrate that this logic can: (1) successfully control the F100 dynamic digital engine simulation over its operating range, (2) be adequately programed on NASA's digital computer/controller, and (3) control both the hybrid computer real-time engine simulation and the F100 engine in an altitude test facility.

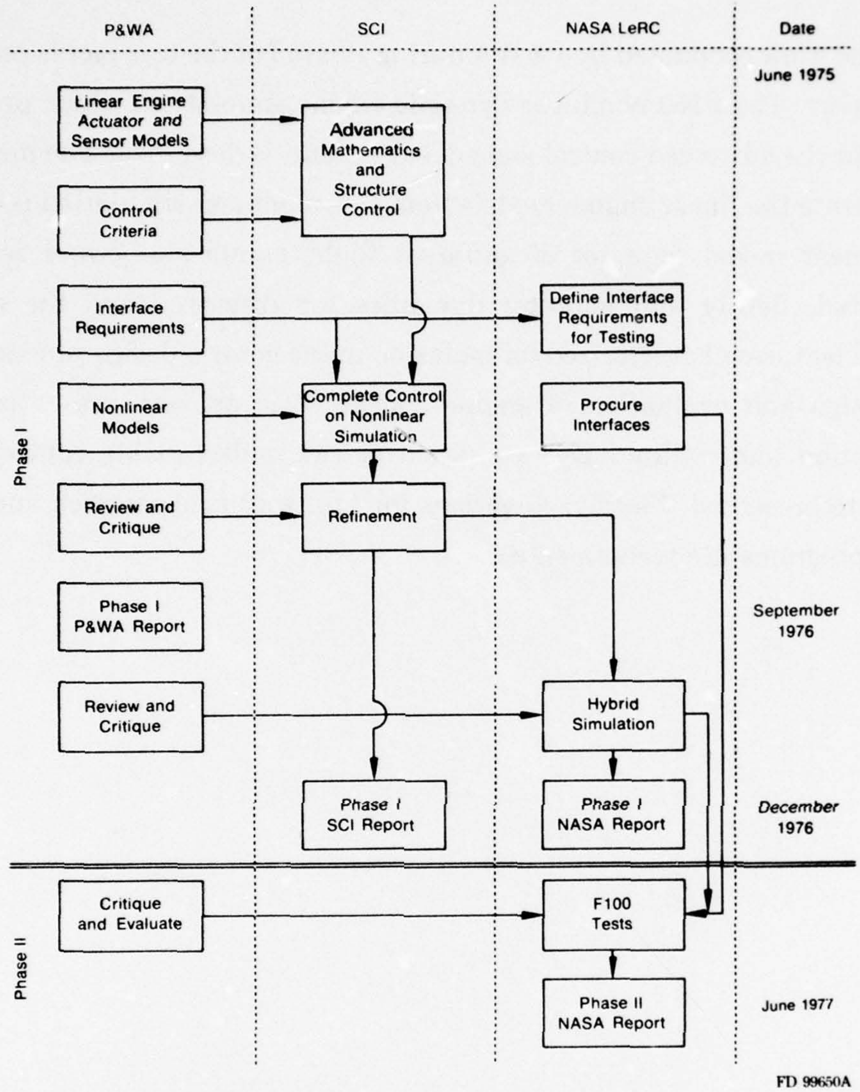


Figure 1. Total Engine Support Program Outline

The total program, as shown in Figure 1, is a 19-month Phase I effort, culminating in a hybrid computer evaluation of the control system, and a 6-month Phase II effort, concluding in a F100 engine test and evaluation in a NASA Lewis altitude test facility. At the conclusion of the Phase I effort, P&WA, SCI, and NASA will each report on the work conducted. Only NASA will report on the Phase II tests.

The work conducted by P&WA during Phase I of the contract is presented in this report. The F100 nonlinear dynamic engine simulation, which provides the basis for the advanced control logic development, is described. The method used to generate the linear engine models from this nonlinear simulation is discussed, and linear model data for 35 different flight points and power settings are presented. Sensor and actuator dynamics are discussed and the significant control features characterized for inclusion in the control design process. Criteria for design and evaluation of engine control logic are also presented. A brief description and preliminary evaluation of the multivariable control research logic are presented. Finally, directions for future control research and development programs are recommended.

SECTION II

F100 ENGINE DESCRIPTION

The engine selected for this research program is a Pratt & Whitney Aircraft F100 afterburning turbofan, representative of current high-technology engines as illustrated in Figure 2. The F100-PW-100 is a low-bypass-ratio, twin-spool, axial-flow turbofan engine, consisting of the following components:

- Three-stage fan driven by a two-stage turbine
- Ten-stage compressor driven by an aircooled two-stage turbine
- Main burner with an annular chamber
- Annular fan duct that surrounds the basic gas generator and discharges air in the mixed-flow augmentor
- Variable area nozzle

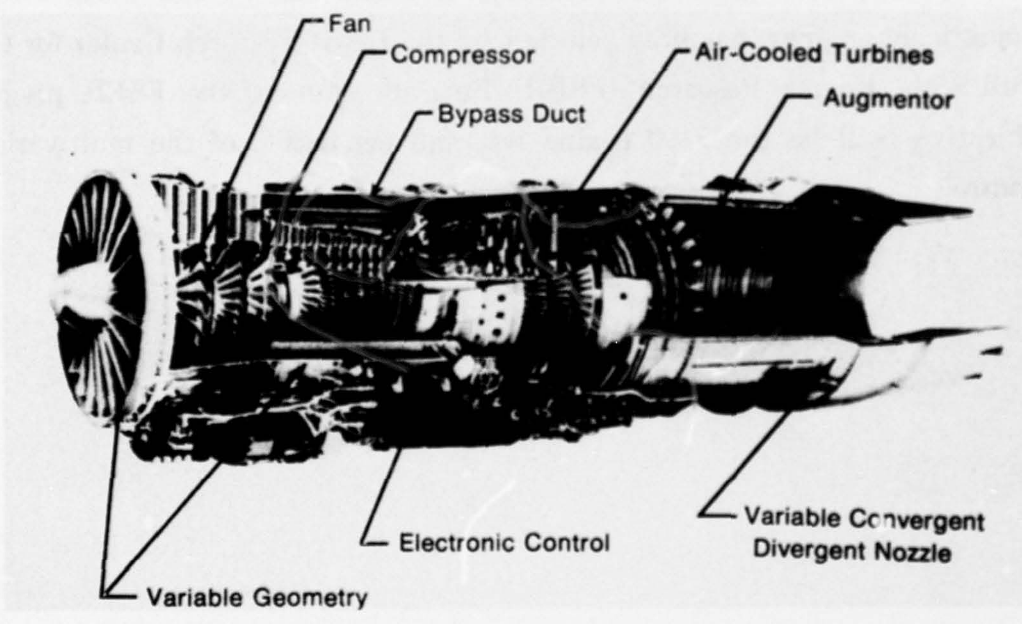


Figure 2. F100 High Technology Engine

An inlet guide vane with a movable trailing edge to achieve variable airfoil camber is used ahead of the fan to improve inlet distortion tolerance and fan efficiency. The first three stators of the high compressor are variable to improve starting and high Mach number characteristics. Airflow bleed is extracted at the compressor exit for installation requirements and starting. The exhaust nozzle for the engine is a balance beam design with actuated divergent flap. The variable geometry of the balanced-beam nozzle enables all three nozzle performance parameters (nozzle area, expansion ratio, and boat-tail drag) to be simultaneously near optimum through the operating range. The fuel control is basically hydromechanical with an engine mounted digital electronic supervisory control. The engine has great potential for being adapted to an all-digital electronic control, which would then allow more versatile control and permit fully optimized engine operation at all flight conditions. In addition, an all-digital electronic control could accommodate the multivariable control logic to be developed in this program. This engine, being one of the most modern operational engines, has been selected by the Lewis Research Center for their Full-Scale Engine Research (FSER) Program. Among the FSER program objectives will be the F100 engine test and evaluation of the multivariable control.

SECTION III

F100 ENGINE DYNAMIC SIMULATION

NONLINEAR DECK

The F100 dynamic simulation used for this program consists of individual representations of the major engine components, such as the fan, compressor, burner, turbines, duct, and augmentor; with gas law relationships governing the component performance and interactions. The dynamic or time-varying relationships are based on natural laws of conservation of mass and energy. Calculations are made using the rotor inertial effects, enclosed volume capacitive effects, and transient heat transfer effects. Dynamic elements, such as integrators and first order time lags, are modeled with recursion formulas. The relationships and calculations combine to form a set of simultaneous, nonlinear differential equations. Figure 3 illustrates the F100 dynamic simulation gas path equations. The simulation also includes an option for using the current F100 engine control. The two primary components for controlling engine operation are the engine electronic control (EEC) and the unified fuel control (UFC). The UFC provides basic scheduling for primary and augmentor fuel flow and distribution, high compressor variable geometry settings (RCVV), compressor bleeds (BLC), and nozzle area setting (A_j). The EEC provides trim to the unified control for aircraft/engine coordination. This is accomplished by trimming engine fuel flow (WFMB), fan inlet guide vanes (CIVV), and nozzle area based on feedback signals from the engine to maximize performance. Engine station designations are identified in Figure 4.

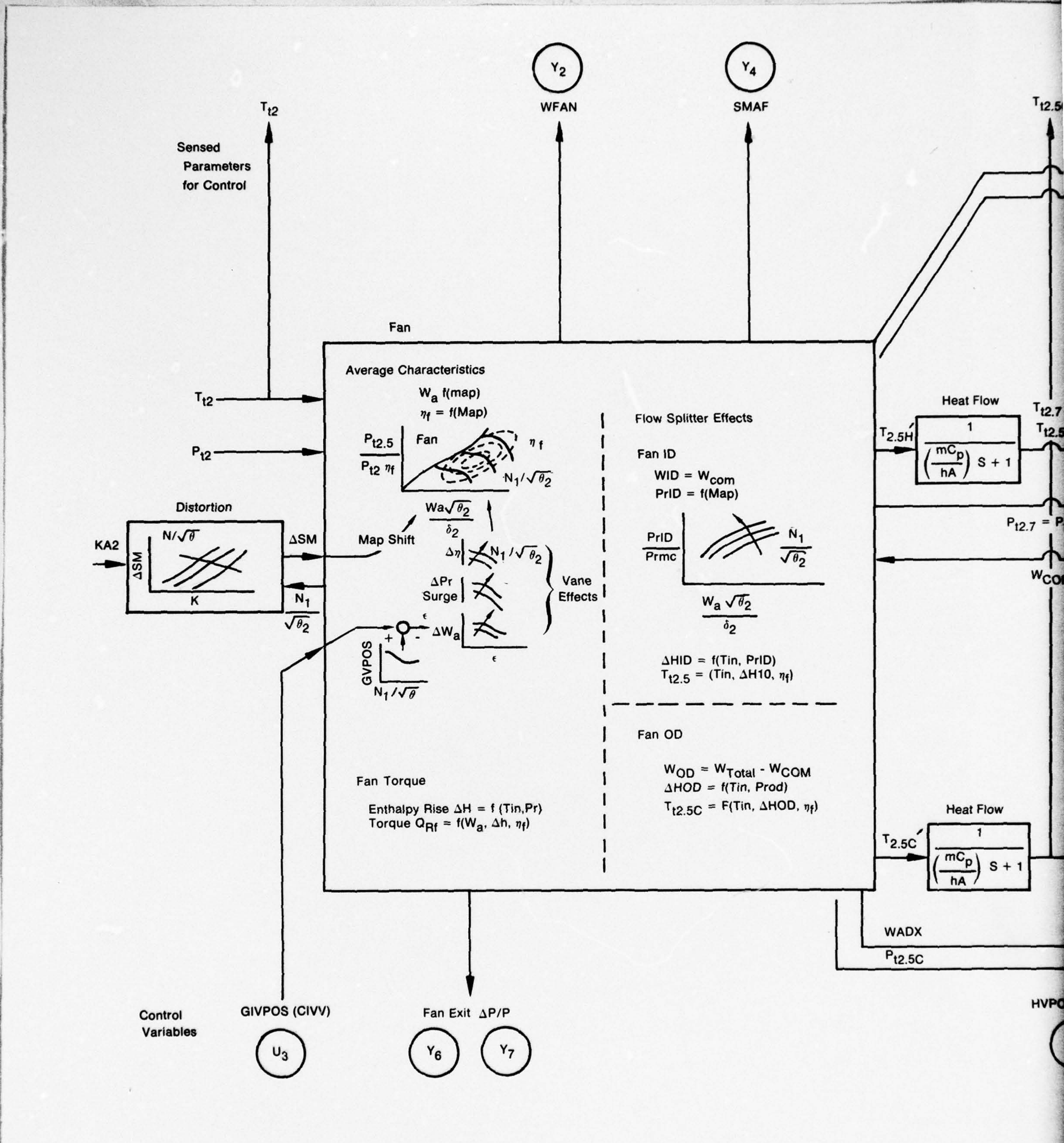
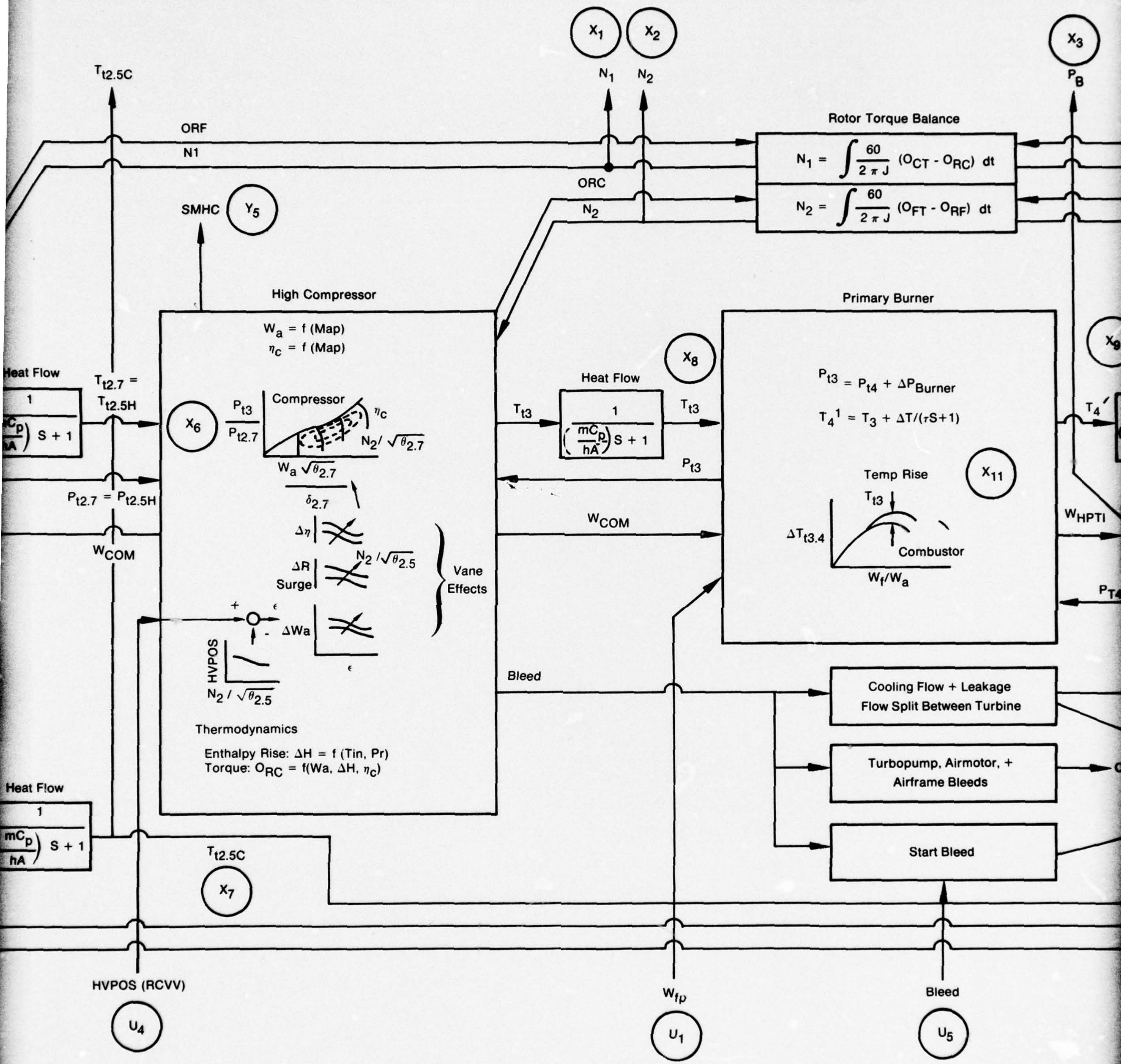
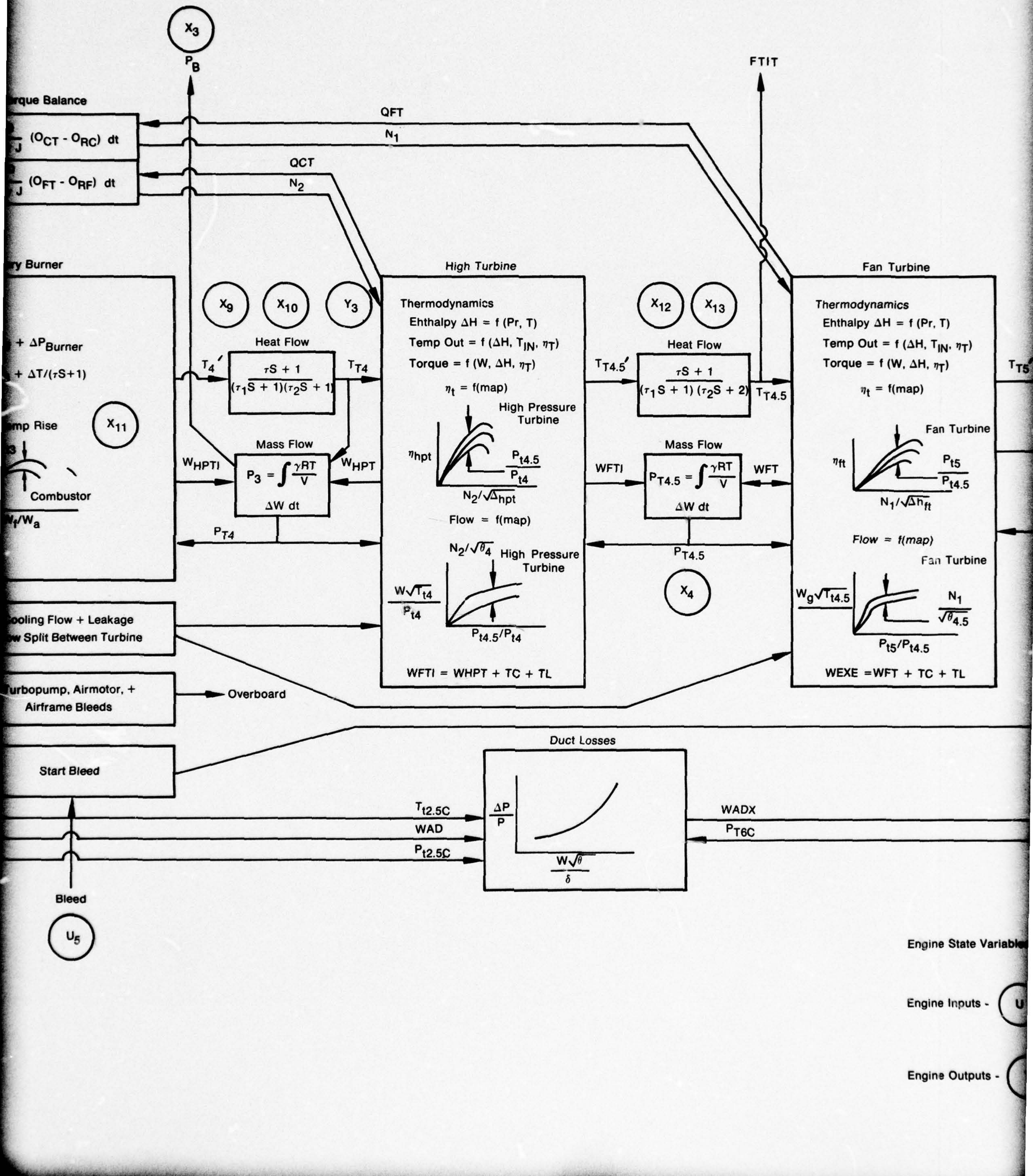


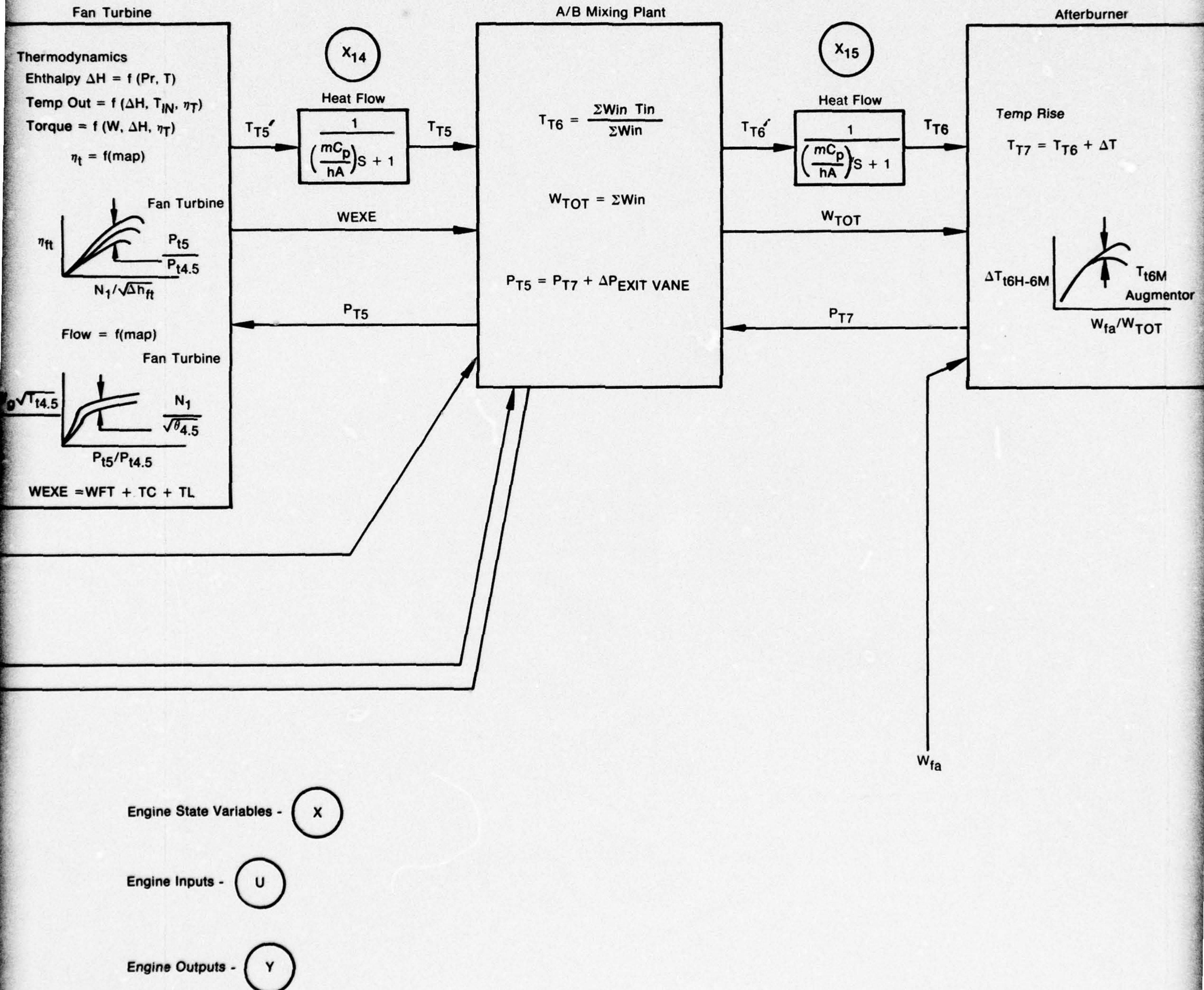
Figure 3. F100 Engine Dynamic Gas Path Equations

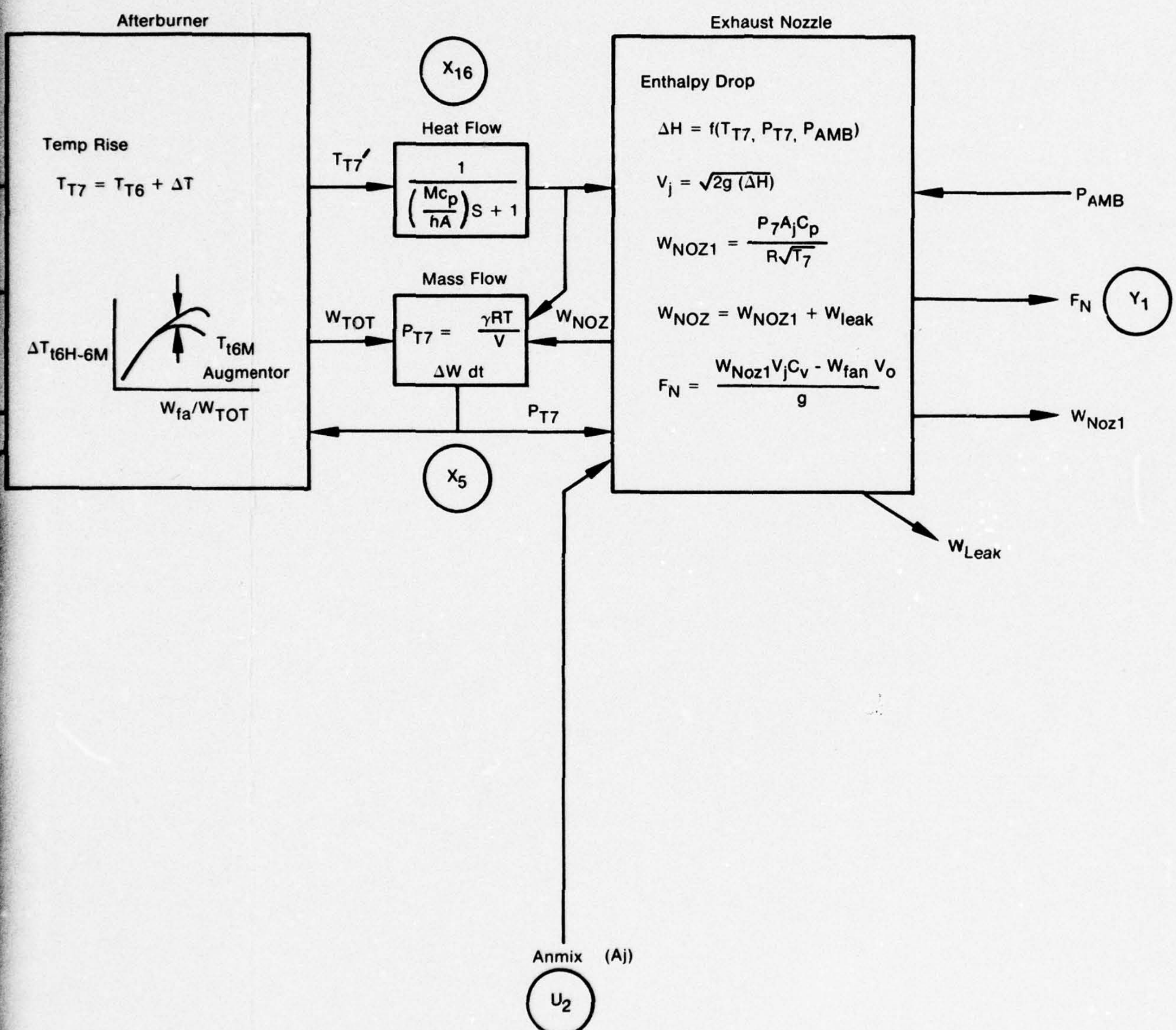


X_1
X_2
X_3
$T_{t2.5C}$
N_1
N_2
P_B
Rotor Torque Balance
ORF
N1
$N_1 = \int \frac{60}{2\pi J}(O_{CT} - O_{RC})\,dt$
ORC
N_2
$N_2 = \int \frac{60}{2\pi J}(O_{FT} - O_{RF})\,dt$
SMHC
Y_5
High Compressor
Primary Burner
W_a = f (Map)
η_c = f (Map)
X_8
X_9
Heat Flow
$T_{t2.7} = T_{t2.5H}$
X_6
$\frac{P_{t3}}{P_{t2.7}}$
Compressor
η_c
$N_2/\sqrt{\theta_{2.7}}$
$\frac{W_a\sqrt{\theta_{2.7}}}{\delta_{2.7}}$
Heat Flow
$\frac{1}{\left(\frac{mC_p}{hA}\right)S + 1}$
T_{t3}
T_{t3}
$P_{t3} = P_{t4} + \Delta P_{Burner}$
$T_4{}^1 = T_3 + \Delta T/(\tau S+1)$
$T_4{}'$
P_{t3}
$P_{t2.7} = P_{t2.5H}$
Temp Rise
X_{11}
T_{t3}
$\Delta T_{t3.4}$
Combustor
W_f/W_a
W_{COM}
W_{COM}
W_{HPTI}
$\Delta\eta$
ΔR
Surge
$N_2/\sqrt{\theta_{2.5}}$
Vane
Effects
ΔWa
ϵ
HVPOS
$N_2/\sqrt{\theta_{2.5}}$
P_{T4}
Bleed
Cooling Flow + Leakage
Flow Split Between Turbine
Thermodynamics
Enthalpy Rise: ΔH = f (Tin, Pr)
Torque: O_{RC} = f(Wa, ΔH, η_c)
Turbopump, Airmotor, +
Airframe Bleeds
Heat Flow
$T_{t2.5C}$
X_7
Start Bleed
HVPOS (RCVV)
W_{fp}
Bleed
U_4
U_1
U_5



X_3
P_B
FTIT
rque Balance
$(O_{CT} - O_{RC})$ dt
$(O_{FT} - O_{RF})$ dt
QFT
N_1
QCT
N_2
ry Burner
+ ΔP_{Burner}
+ $\Delta T/(\tau S+1)$
mp Rise
Combustor
W_f/W_a
X_9
X_{10}
Y_3
X_{11}
Heat Flow
T_4'
$\frac{\tau S + 1}{(\tau_1 S + 1)(\tau_2 S + 1)}$
T_{T4}
Mass Flow
W_{HPTI}
$P_3 = \int \frac{\gamma RT}{V} \Delta W\, dt$
W_{HPT}
P_{T4}
High Turbine
Thermodynamics
Ehthalpy ΔH = f (Pr, T)
Temp Out = f (ΔH, T_{IN}, η_T)
Torque = f (W, ΔH, η_T)
η_t = f(map)
High Pressure Turbine
η_{hpt}
$\frac{P_{t4.5}}{P_{t4}}$
$N_2/\sqrt{\Delta_{hpt}}$
Flow = f(map)
$N_2/\sqrt{\theta_4}$
High Pressure Turbine
$\frac{W\sqrt{T_{t4}}}{P_{t4}}$
$P_{t4.5}/P_{t4}$
WFTI = WHPT + TC + TL
X_{12}
X_{13}
Heat Flow
$T_{T4.5}'$
$\frac{\tau S + 1}{(\tau_1 S + 1)(\tau_2 S + 2)}$
$T_{T4.5}$
Mass Flow
WFTI
$P_{T4.5} = \int \frac{\gamma RT}{V} \Delta W\, dt$
WFT
$P_{T4.5}$
X_4
Fan Turbine
Thermodynamics
Ehthalpy ΔH = f (Pr, T)
Temp Out = f (ΔH, T_{IN}, η_T)
Torque = f (W, ΔH, η_T)
η_t = f(map)
Fan Turbine
η_{ft}
$\frac{P_{t5}}{P_{t4.5}}$
$N_1/\sqrt{\Delta h_{ft}}$
Flow = f(map)
Fan Turbine
$W_g\sqrt{T_{t4.5}}$
$\frac{N_1}{\sqrt{\theta_{4.5}}}$
$P_{t5}/P_{t4.5}$
WEXE = WFT + TC + TL
T_{T5}'
ooling Flow + Leakage
w Split Between Turbine
urbopump, Airmotor, +
Airframe Bleeds
Overboard
Start Bleed
Duct Losses
$T_{t2.5C}$
WAD
$P_{t2.5C}$
$\frac{\Delta P}{P}$
$\frac{W\sqrt{\theta}}{\delta}$
WADX
P_{T6C}
Bleed
U_5
Engine State Variabl
Engine Inputs -
Engine Outputs -


Fan Turbine
Thermodynamics
Ehthalpy ΔH = f (Pr, T)
Temp Out = f (ΔH, T_IN, η_T)
Torque = f (W, ΔH, η_T)
η_t = f(map)
Fan Turbine
η_ft
P_t5/P_t4.5
N_1/√Δh_ft
Flow = f(map)
Fan Turbine
N_1/√θ_4.5
P_t5/P_t4.5
WEXE = WFT + TC + TL
X_14
Heat Flow
T_T5'
T_T5
WEXE
P_T5
A/B Mixing Plant
T_T6 = ΣWin Tin / ΣWin
W_TOT = ΣWin
P_T5 = P_T7 + ΔP_EXIT VANE
X_15
Heat Flow
T_T6'
T_T6
W_TOT
P_T7
Afterburner
Temp Rise
T_T7 = T_T6 + ΔT
ΔT_t6H-6M
T_t6M
Augmentor
W_fa/W_TOT
W_fa
Engine State Variables - X
Engine Inputs - U
Engine Outputs - Y



Afterburner
Temp Rise
$T_{T7} = T_{T6} + \Delta T$
$\Delta T_{t6H\text{-}6M}$
T_{t6M}
Augmentor
W_{fa}/W_{TOT}
X_{16}
Heat Flow
T_{T7}'
$\frac{1}{\left(\frac{Mc_p}{hA}\right)S + 1}$
Mass Flow
W_{TOT}
$P_{T7} = \frac{\gamma RT}{V} \int \Delta W\, dt$
W_{NOZ}
P_{T7}
X_5
Exhaust Nozzle
Enthalpy Drop
$\Delta H = f(T_{T7}, P_{T7}, P_{AMB})$
$V_j = \sqrt{2g\,(\Delta H)}$
$W_{NOZ1} = \frac{P_7 A_j C_p}{R\sqrt{T_7}}$
$W_{NOZ} = W_{NOZ1} + W_{leak}$
$F_N = \frac{W_{Noz1} V_j C_v - W_{fan} V_o}{g}$
P_{AMB}
F_N
Y_1
W_{Noz1}
W_{Leak}
Anmix (Aj)
U_2

FD 87550A

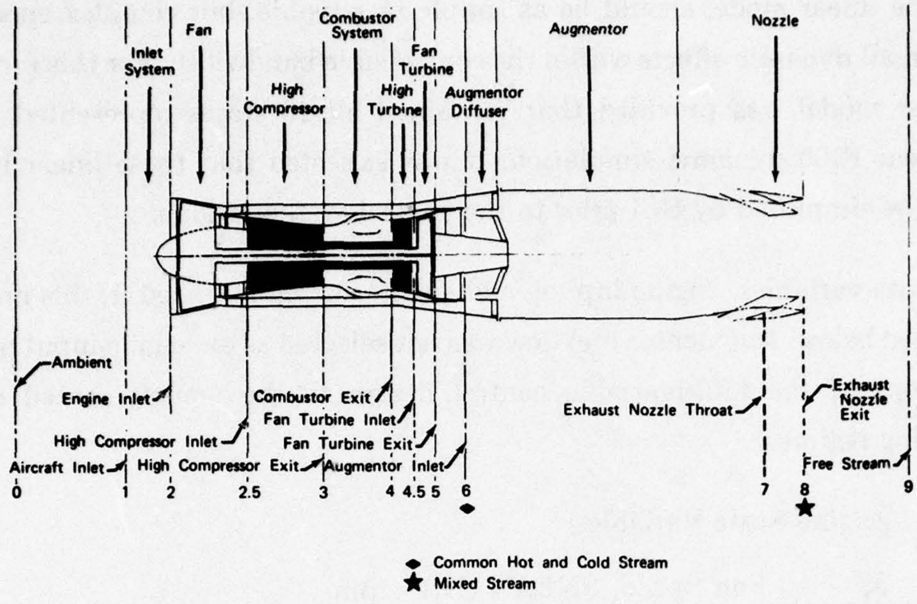
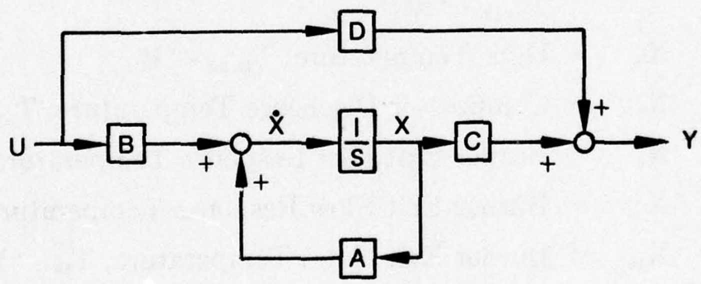


Figure 4. F100 Component and Station Identification

LINEAR MODEL

The linear F100 model provided is of the form:

$$\dot{X} = AX + BU$$
$$Y = CX + DU$$
$$\dot{X} = \frac{dx}{dt}$$



where X is the vector of state variables, such as pressures and rotor speeds, $\dot{X}$ is the time derivative of the state vector, U is the vector of control inputs, such as fuel flow and exhaust nozzle area, and Y is the vector of observed parameters, such as thrust or airflow. "A" is the plant matrix and its elements are the partials from each state variable to each state variable time derivative. Elements of the output matrix "C" define the effect of each state variable on each observed variable. The control matrix "B" and the direct couple matrix "D" define the effect of each control variable on each state variable time derivative and each observed parameter, respectively.

The linear model should be as simple as possible, but complex enough to contain all dynamic effects within the controllable bandwidth. For this program, a linear model was provided that contained all 16 states represented in the nonlinear F100 dynamic simulation. It was expected that these linear models would be simplified by SCI prior to the control system design.

State variables, engine inputs, and engine outputs utilized in this program are listed below. Augmentor fuel flow was not selected as an engine input to limit the scope of the multivariable control design to the nonaugmented engine operating regimes.

1. Engine State Variables

X_1 = Fan Speed, SNFAN (N_1) - rpm
X_2 = Compressor Speed, SNCOM (N_2) - rpm
X_3 = Compressor Discharge Pressure, P_{t3} - psia
X_4 = Interturbine Volume Pressure, $P_{t4.5}$ - psia
X_5 = Augmentor Pressure, P_{t7m} - psia
X_6 = Fan Inside Diameter Discharge Temperature, $T_{t2.5h}$ - °R
X_7 = Duct Temperature, $T_{t2.5c}$ - °R
X_8 = Compressor Discharge Temperature, T_{t3} - °R
X_9 = Burner Exit Fast Response Temperature, T_{t4hi} - °R
X_{10} = Burner Exit Slow Response Temperature, T_{t4lo} - °R
X_{11} = Burner Exit Total Temperature, T_{t4} - °R
X_{12} = Fan Turbine Inlet Fast Response Temperature, $T_{t4.5hi}$ - °R
X_{13} = Fan Turbine Inlet Slow Response Temperature, $T_{t4.5lo}$ - °R
X_{14} = Fan Turbine Exit Temperature, T_{t5} - °R
X_{15} = Duct Exit Temperature, T_{t6c} - °R
X_{16} = Duct Exit Temperature, T_{t7m} - °R

2. Engine Inputs

U_1 = Main Burner Fuel Flow, WFMB - lb/hr

U_2 = Nozzle Jet Area, A_J - ft^2

U_3 = Inlet Guide Vane Position, CIVV - deg

U_4 = High Compressor Variable Vane Position, RCVV - deg

U_5 = Customer Compressor Bleed Flow, BLC - %

3. Engine Outputs

Y_1 = Engine Net Thrust Level, FN - lb

Y_2 = Total Engine Airflow, WFAN - lb/sec

Y_3 = Turbine Inlet Temperature, T_{t4} - °R

Y_4 = Fan Stall Margin, SMAF

Y_5 = Compressor Stall Margin, SMHC

Y_6 = Fan Exit $\Delta P/P$, $(P_{t2.5} - P_{s2.5})/P_{s2.5}$, based on test data

Y_7 = Fan Exit $\Delta P/P$, $(P_{t2.5} - P_{s2.5})/P_{s2.5}$, theoretical function of area and airflow.

These states, inputs, and outputs can be noted on Figure 3. The 16 states are the outputs of the 16 integrations. In the heat transfer cases, the integrations are implied by the transfer functions.

The matrix coefficients for this program were generated by Pratt & Whitney Aircraft using an offset derivative technique with a forced steady-state match. This technique was computerized on the F100 dynamic simulation and operated as follows.

- Each X was perturbed one at a time while holding all other X's and all U's constant. This allows calculations of the A and C matrix components.

$$\dot{X} = A \cdot X + B \cdot 0$$
$$Y = C \cdot X + D \cdot 0$$

For a simple 2×2 A, B, C, D example:

$$
\begin{array}{llcl}
 & A_{11} = \dot{X}_1/X_1 & & C_{11} = Y_1/X_1 \\
 & A_{12} = \dot{X}_1/X_2 & & C_{12} = Y_1/X_2 \\
 & A_{21} = \dot{X}_2/X_1 & & C_{21} = Y_2/X_1 \\
 & A_{22} = \dot{X}_2/X_2 & & C_{22} = Y_2/X_2 \\
\text{or} & Aij = \dot{X}i/Xj & & Cij = Yi/Yj
\end{array}
$$

- Each U is then perturbed, one at a time, with the simulation operating in the steady-state mode. This forces the B and D matrixes into a steady-state match for X and Y with perturbations in U.

  $$AX + BU = 0$$
  $$CX + DU = Y$$
  $$A, C = \text{known}$$

  For a simple 2×2 A, B, C, D example:

$$
\begin{array}{ll}
 & B_{11} = -(A_{11}X_1 + A_{12}X_2)/U_1 \\
 & B_{12} = -(A_{11}X_1 + A_{12}X_2)/U_2 \\
 & B_{21} = -(A_{21}X_1 + A_{22}X_2)/U_1 \\
 & B_{22} = -(A_{21}X_1 + A_{22}X_2)/U_2 \\
 & D_{11} = (Y_1 - C_{11}X_1 - C_{12}X_2)/U_1 \\
 & D_{12} = (Y_1 - C_{11}X_1 - C_{12}X_2)/U_2 \\
 & D_{21} = (Y_2 - C_{21}X_1 - C_{22}X_2)/U_1 \\
 & D_{22} = (Y_2 - C_{21}X_1 - C_{22}X_2)/U_2 \\
\text{or} & Bij = -(Ai_1X_1 + Ai_2X_2 + \ldots)/Uj \\
 & Dij = (Yi - Ci_1X_1 - Ci_2X_2 - \ldots)/Uj
\end{array}
$$

The complete set of A, B, C, and D matrix coefficients is provided in Appendix B

Several different levels of perturbations on the states (X's) and inputs (U's) were evaluated at sea level static (SLS) idle. For other programs this has proved to be the most difficult point to obtain good linear models. This was also true for this program, so idle was used for model and perturbation comparisons.

Statistical error indexes were calculated to mathematically compare the different perturbation combinations. The error index is an indicator of how closely the response of the linear and nonlinear models match as a function of time. The error index was defined as:

$$\text{Error Index for State X} = \sqrt{\sum_{i=1}^{n} \left(\frac{\Delta X_{li} - \Delta X_{nli}}{\Delta X_{nli}} \right)^2}$$

where: ΔX_l = Linear model state variable change in response to a change in U

ΔX_{nl} = Nonlinear model state variable change in response to a change in U

i = Points in time selected for comparison

n = Number of points selected.

For these studies, every sample time (0.007 sec) was used in the error index for 8-sec transients.

Figure 5 illustrates error index differences for each of the 16 states with various levels of input steps. Error indexes of less than 0.001 provided a good transient match to the nonlinear deck, as illustrated by Figure 6, which compares linear and nonlinear responses at SLS idle for a fuel flow step. Studies at other power settings and flight conditions showed the "best" overall agreement between linear and nonlinear model occurred when the states were perturbed 0.5% and the inputs were perturbed as follows:

WFMB	3%
A_j	3%
CIVV	5 deg
RCVV	1 deg
BLC	0.2%

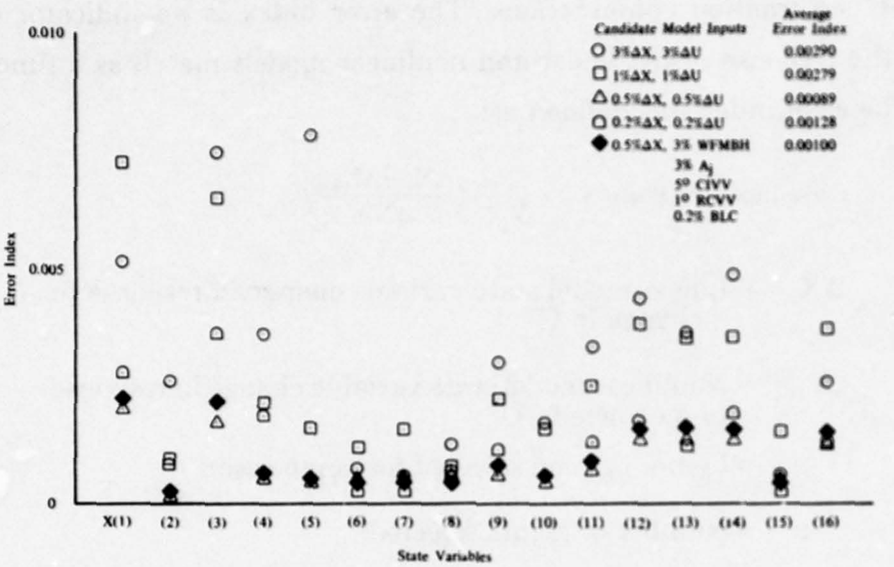


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Figure 5. Error Index Differences

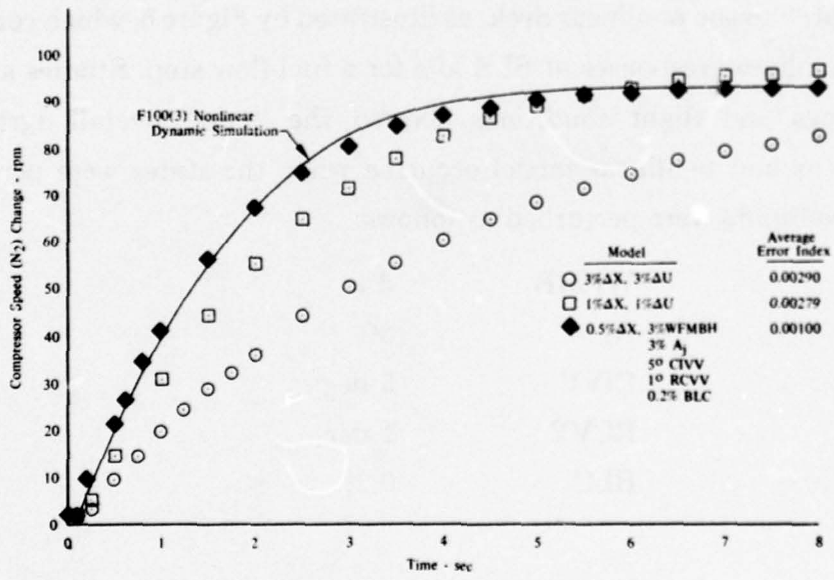

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Figure 6. Sixteen-State Linear to Nonlinear Model Comparison - Idle Power

The same perturbation steps were used for all linear model development. Figure 7 compares the linear and nonlinear model responses at intermediate power for other parameters. Illustrated are fuel flow, burner pressure, turbine inlet temperature, and fan stall margin changes. The slight steady-state differences that occur are attributed to deck tolerances, and the models are considered to be in good agreement.

Advantages of the offset derivative method are short computer run time and improved steady-state matching. The dynamic characteristics (system eigenvalues and time response) of the linear models generated by this technique have been found to be similar to those generated using the least square coefficient matching technique in system output data. One disadvantage is that the offset derivative technique does not have the potential of being applied directly to test data.

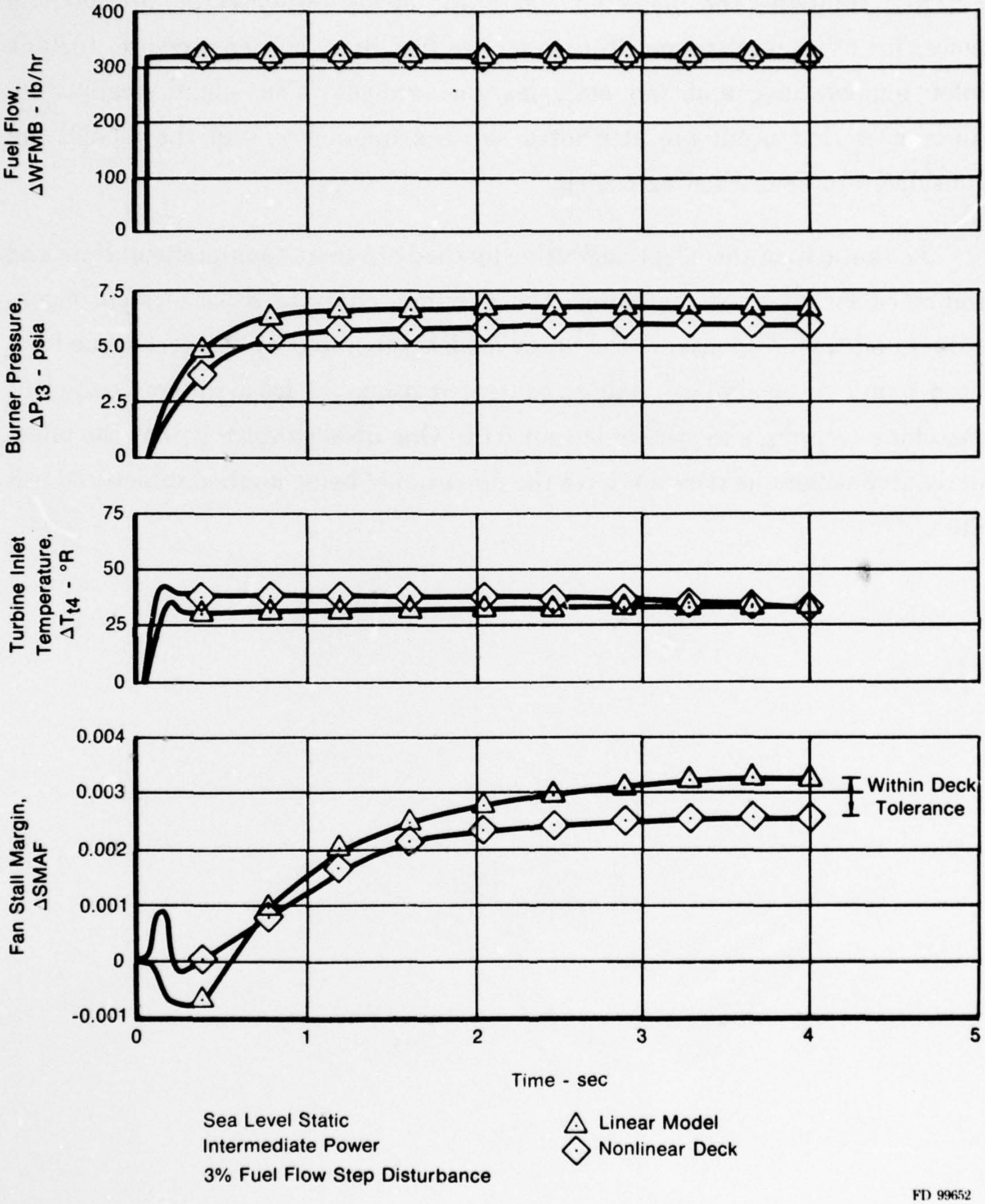


Figure 7. Sixteen-State Linear to Nonlinear Model Comparison - Intermediate Power

SECTION IV

SENSOR AND ACTUATOR CHARACTERISTICS

The dynamic characteristics of the control actuators and sensors have been linearized as described in the following paragraphs. These linear models were added to the linear engine model to obtain a total plant (sensor-engine-actuator) model for use in the LQR synthesis process. In many cases, the nonlinear effects that have been removed have a significant effect on the system operation so that the results of the linear analysis must be carefully interpreted.

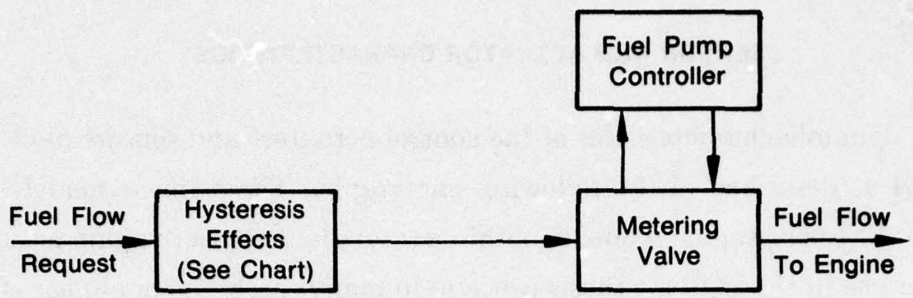
The five control variables (WFMB, RCVV, CIVV, A_j, and BLC) are positioned by actuators with limits and maximum slew rates, as shown in Table I.

Table I. Actuator Limits and Maximum Rates

Actuator	*Maximum*	*Minimum*	*Rate Limits*
WFMB	16,300 lb/hr	450 lb/hr	15,800 lb/hr/sec
RCVV	4 deg (Axial)	−40 deg (Cambered)	40 deg/sec
CIVV	0 deg (Axial)	−40 deg (Cambered)	48 deg/sec
A_j	6.4 ft^2	2.8 ft^2	1.8 to 3.6 ft^2/sec
BLC	6%	0	Instantaneous

The dynamics of the main burner fuel flow (WFMB) path are dominated by the fuel metering valve and the pump controller, which also regulates the system pressure. The hysteresis represents an accumulation of mechanical backlash in the linkages and servos of the hydromechanical control system. The fuel flow hysteresis effects are relatively small and can be removed with no serious consequences. The fuel flow dynamics can then be represented by a series of two simple first order elements (Figure 8).

Fuel System



Fuel Flow (PPH)	Hysteresis (±PPH)
450 to 800	14
4,000	27
8,000	51
10,400 to 16,300	95

Linearized Dynamics

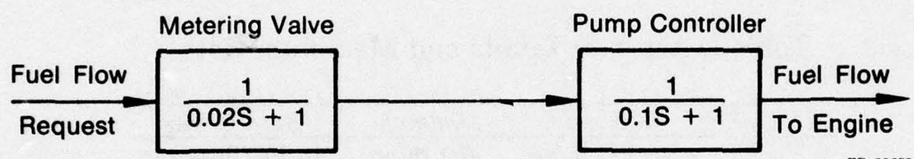


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Figure 8. Main Burner Fuel Flow Dynamics

The rear compressor variable vane (RCVV) actuation system (Figure 9) is characterized by nonlinear actuation rates and vane linkage hysteresis. This loop can be linearized by replacing the control rate curve with a gain of 40 deg/sec and removing the linkage hysteresis function. These nonlinear items are significant and must be considered as the control analysis proceeds.

The compressor inlet variable vane (CIVV) actuation system includes a stepper motor interface (Figure 10). This loop is linearized by assuming the stepper motor is continuously variable and removing the nonlinear control rate and position limits. There is no significant hysteresis in the CIVV system.

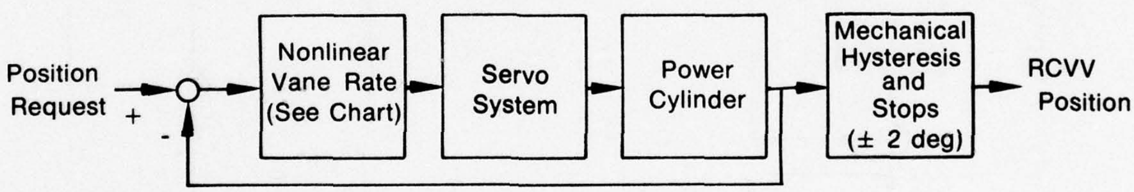
The exhaust nozzle jet area (A_j) control synamics, (Figure 11) are highly dependent on the nozzle pressure loading conditions and the pneumatic power supply pressures and temperatures. The linearized representation is derived from a nonlinear simulation model and is valid for input steps of ±3%. The damping

(0.27 to 0.56) and natural frequency (3 to 6 Hz) ranges include the effects of both flight condition and power setting variations.

The customer bleed (BLC) actuator is not part of the F100 system. Test data show the response of this valve to be virtually instantaneous. For a practical system, a servo time constant of 0.02 sec can be assumed.

With the exception of the FTIT and $T_{t2.5}$ sensors, the engine sensors can be represented by first order time constants, as presented in Table II. The fan speed (N_1) sensor dynamics represent an electronic blade counting device. The compressor speed (N_2) sensor is a hydromechanical device mounted on the main fuel pump. The T_{t2} sensor response is typical of a shielded thermocouple placed directly in the airstream. The pressure sensor (P_b) represents a hydromechanical device used with the current control. A typical electrical pressure sensor that has been set up to avoid excessive line dynamics would be faster with a time constant on the order of 0.01 to 0.02 sec.

RCVV System



RCVV Error (deg)	Vane Slew Rate (deg/sec)
-50.0	-40.0
- 1.0	-40.0
- 0.5	0.0
0.5	0.0
1.0	40.0
50.0	40.0

Linearized Dynamics

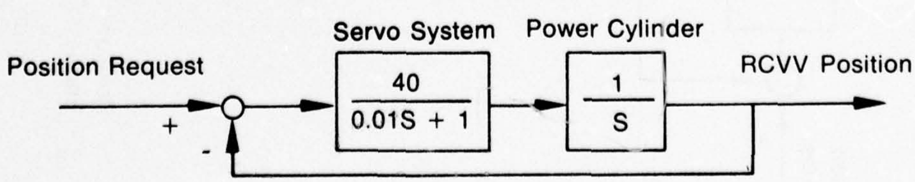


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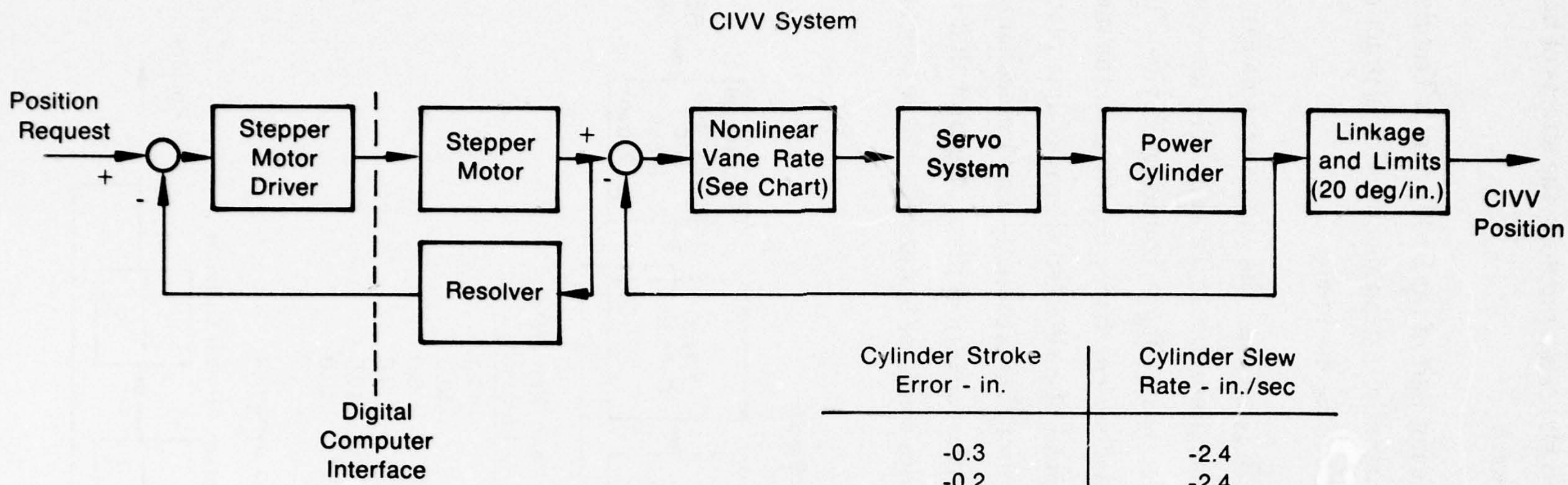
Figure 9. RCVV Actuation System



Cylinder Stroke Error - in.	Cylinder Slew Rate - in./sec
-0.3	-2.4
-0.2	-2.4
-0.03	0
0.03	0
0.2	2.4
0.3	2.4

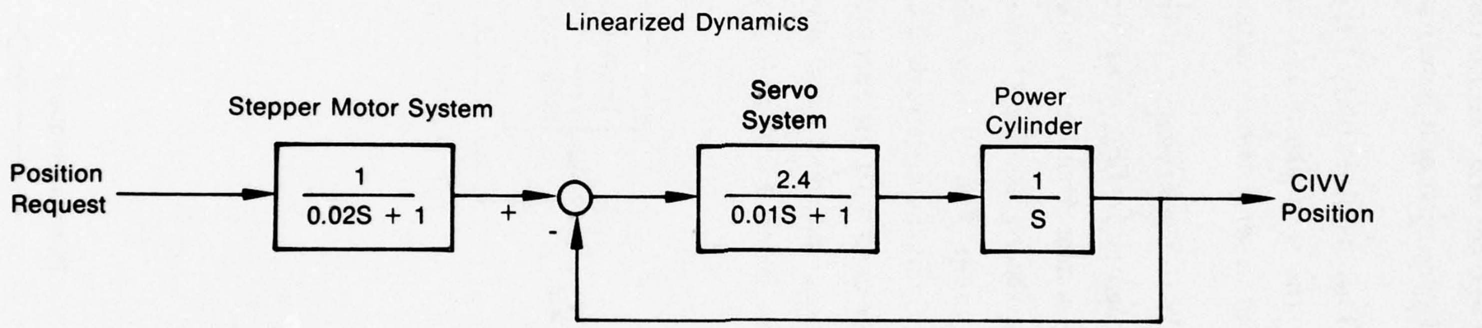


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Figure 10. CIVV Actuation System

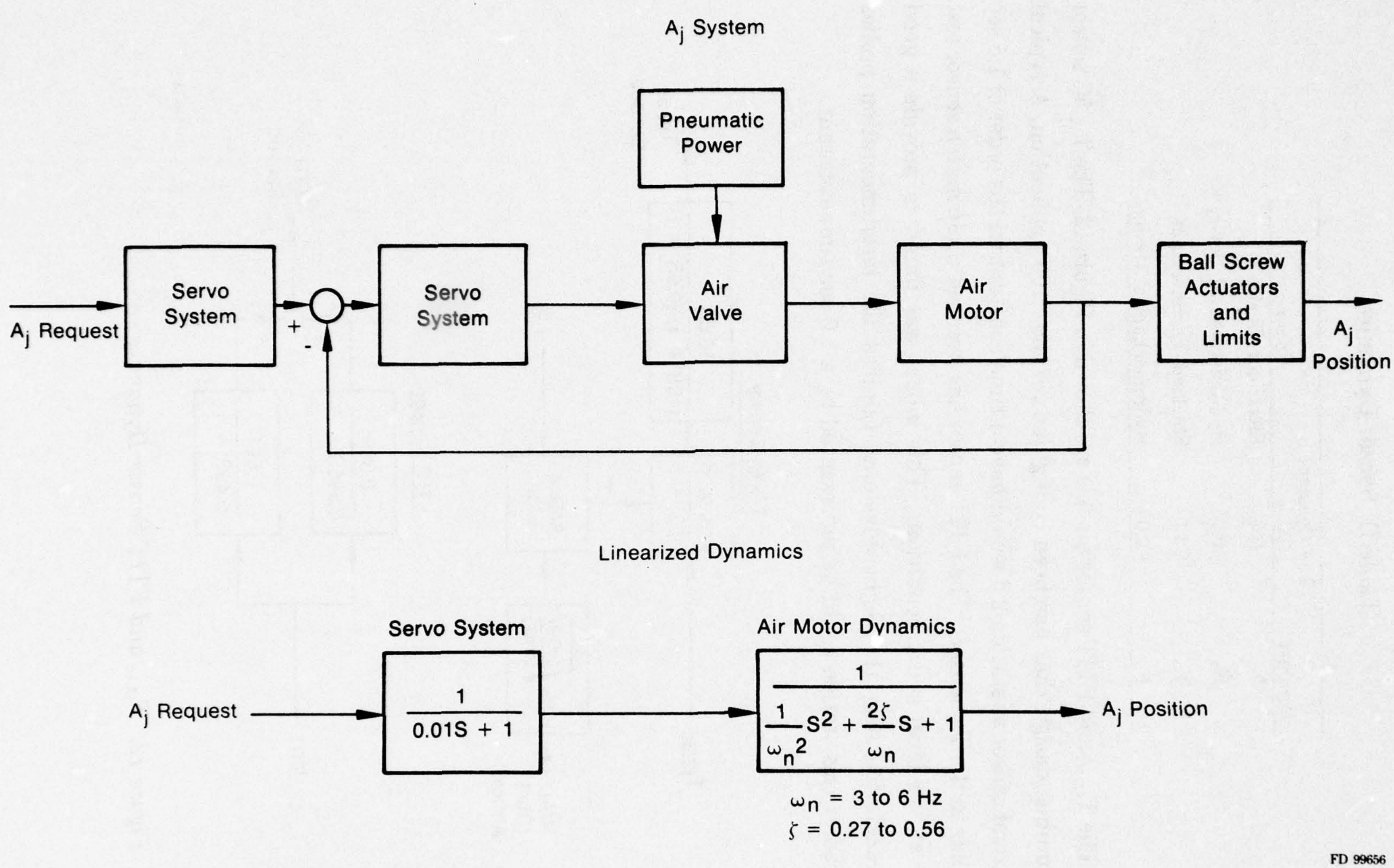


Figure 11. Exhaust Nozzle Actuation System

Table II. Sensor Dynamics

Parameter	*Time Constant (sec)*	*Comments*
N_1	0.03	Electronic Device
N_2	0.05	Hydromechanical Device
T_{t2}	1.5	Shielded Thermocouple
P_b	0.05	Hydromechanical Device

The $T_{t2.5C}$ and FTIT sensor models are shown in Figure 12. The T_{t2}.5C sensor is a unique design that has been configured for the F100 application. A typical electrical sensor at station 2.5 would have a time constant on the order of 1.5 sec (similar to the T_{t2} sensor). The FTIT sensor has been set up to match sensor test data at sea level static conditions. This model was found to provide a good representation over the flight envelope. Limited life instrumentation probes located at this station could be represented by a 1.0-sec time constant.

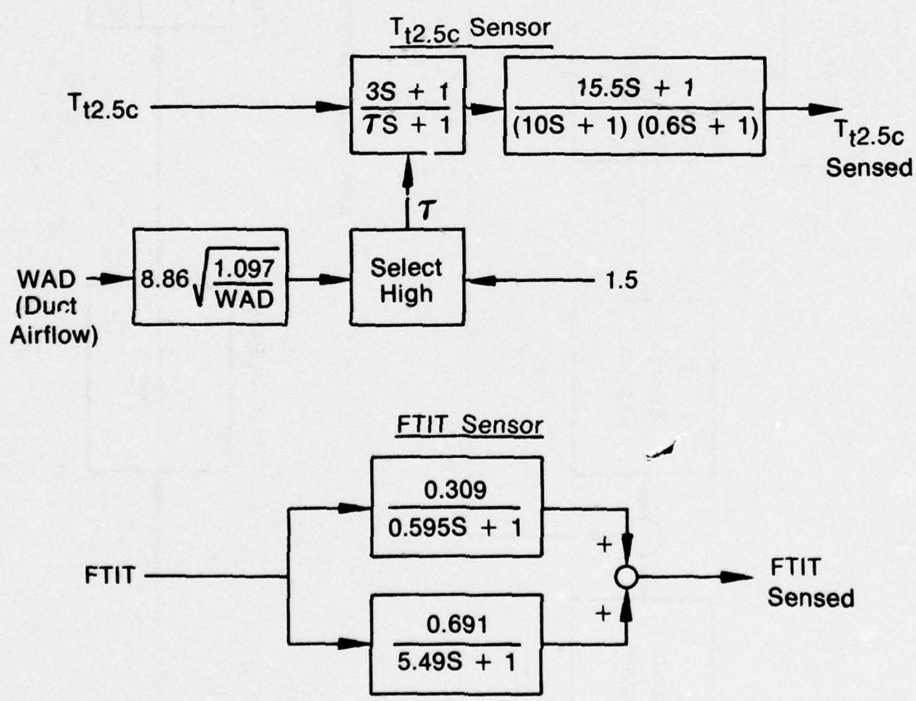


Figure 12. $T_{t2.5c}$ and FTIT Sensor Dynamics

SECTION V

F100 ENGINE CONTROL CRITERIA

Advanced propulsion systems operate at or near design limits with tight control of speed, pressure, temperature, and airflow to achieve maximum performance while maintaining engine durability. An accurate and reliable control system is required to ensure high engine performance and operational stability throughout the flight envelope. The control system must sense pilot commands, airframe requirements, and critical engine parameters; compute the necessary schedules; and actuate system variables for total engine control over the full range of operation. Mission, airframe, and engine requirements are combined to generate a control criteria list as shown on Table III. These criteria may differ in details for more complex propulsion systems, but the general character will be the same. Table III represents an approximate priority list of the design criteria for the F100 system. Engine protection is at the top of the list because of concern for aircraft safety. In cases where safety of the aircraft depends on engine dynamics (for example, V/STOL), transient response would move to the top of the list, along with engine protection.

ENGINE PROTECTION

Limiting values that must not be exceeded to ensure adequate protection of the engine are described in the following paragraphs.

Temperature Limits

The actual temperatures that must be maintained within limits to protect the engine are T_{t3} (compressor discharge temperature) and T_{t4} (turbine inlet temperature). The T_{t3} limit is based on maximum allowable metal temperature and the fact that turbine cooling effectiveness decreases rapidly above this value. The T_{t4} limit is based on maximum allowable metal temperature and turbine life considerations.

Table III. Outline of Control Criteria

Engine Protection		
	Temperature limits	
	Speed Limits	
	Pressure Limit	
	Structural Stability	
Engine Stability		
	Engine Fluctuations	
	Fan and Compressor Stall Margins	
	Augmentor Spikes	
Compatibility With Inlet/Aircraft		
	Airflow Corridor	
	Minimum Burner Pressure	
Steady-State Performance and Accuracy		
	Thrust Modulation	
	Thrust and Fuel Consumption Requirements	
	Control Sensitivity	
		Deterioration
		Installation
		Inlet Conditions
		Augmentor Ignition
	Repeatability	
Transient Requirements		
	Thrust Monotonic Function of Time	
	Acceleration and Deceleration Times	
	Combustion Stability	
Trim Capability/Procedure		
Start/Transition Capability		

The current control limits FTIT (fan turbine inlet temperature) to maintain T_{t3} and T_{t4}, as described above. Engine performance simulations (based on test data) are used to obtain correlations of T_{t3} and T_{t4} with FTIT over a range of engine operating conditions. The correlations are then combined into a schedule of FTIT as a function of T_{t2} (engine inlet total temperature).

To help meet transient response requirements, it is allowable to exceed the FTIT limit for a period of not more than 0.5 sec.

Speed Limits

Fan speed (N_1) is limited as a function of T_{t2} (engine inlet total temperature). Under normal conditions, N_1 will be scheduled below the limit because of performance and stability considerations. Compressor physical speed (N_2) is limited to an absolute maximum value. Usually N_2 is maintained safely below this level. Any overspeed requires at least a visual inspection of the high rotor.

Pressure Limit

To assure structural integrity, burner pressure is limited to a maximum value. This limit is normally encountered only at low-altitude, high Mach number conditions.

Structural Stability

Engine fan and compressor variable geometry must be scheduled within the flutter boundaries.

ENGINE STABILITY

Engine Fluctuations

Under steady-state operating conditions, engine thrust fluctuations between ground idle and maximum continuous thrust must not exceed ±1% of intermediate thrust or ±5% of the thrust available at the power lever position and flight condition, whichever is less. During operation above intermediate thrust, fluctuations must not exceed ±1% of the thrust available at the condition. During engine transients, the variation of engine airflow from the corresponding steady-state values of the power setting selected must not cause propulsion system instability.

Fan and Compressor Stall Margins

The ground rule for fan and compressor stability is to not allow fan stall margin to go below 0.15 or compressor stall margin to go below 0.05. Stall margin is defined by:

$$SM = \left[\frac{(\text{Pressure Ratio Stall - Pressure Ratio Operating})}{\text{Pressure Ratio Stall}} \right]_{\text{At constant airflow}}$$

Augmentor Pressure Spikes

Jet area and augmentor fuel flow must be coordinated during augmentor transients so that the resulting pressure spikes are within the limit. Pressure upspikes are caused by A_J being too small and can result in fan stalls. Downspikes are caused by A_J being too large and can result in augmentor blowouts. (Augmented engine operation will not be investigated in this program. However, pressure spikes resulting from augmentor initiation will be considered.)

COMPATIBILITY WITH INLET/AIRCRAFT

Airflow Corridor

Engine airflow limits are set by inlet constraints. Airflow variation is restricted for supersonic operation to help maintain the inlet shock at a desirable location.

Minimum Burner Pressure

To provide accessory air for various aircraft subsystems, it is required that engine burner pressure be maintained above a minimum level of 50 psia.

STEADY-STATE PERFORMANCE AND ACCURACY

Thrust Modulation

The relationship between thrust and power lever is of the fully modulated type, free of abrupt changes and essentially linear with a thrust step of not more than 4% of intermediate rated thrust when augmentation is initiated or terminated.

Thrust and Fuel Consumption Requirements

Engine thrust and fuel consumption specifications are given in engine specification tables.

Control Sensitivity

Deterioration

The engine must be controlled to maintain the required thrust, regardless of engine deterioration, except where the level of deterioration is such that the engine limits would be exceeded. Fan and compressor efficiency decrements of 1 to 2% are typical. Turbine efficiency losses up to 3% also have been experienced.

Installation

The engine must be controlled so that thrust is insensitive to variations in horsepower extraction and customer bleed flow up to the point where engine limits would be exceeded.

Inlet Conditions

The engine must operate satisfactorily in the face of inlet pressure (P_{t2}) and temperature (T_{t2}) variations and rates of change of inlet conditions common to the operation of highly maneuverable aircraft. Steady-state inlet variations are less than 1% of P_{t2} and T_{t2}. For aircraft accelerations, P_{t2} and T_{t2} rates of change of 0.15 psia/sec and 2°F/sec are representative. For aircraft decelerations, the rates may be as much as −0.5 psia/sec and −7°F/sec.

Augmentor Ignition

The control must be insensitive to augmentor ignition pulse.

Repeatability

Stabilized thrust at any power lever position must be repeatable.

TRANSIENT REQUIREMENTS

Thrust Monotonic Function of Time

For increases or decreases in power lever angle, engine thrust must be a monotonically increasing or decreasing function of time, respectively.

Acceleration and Deceleration Times

Transient thrust response requirements are specified for sea level static, standard day, uninstalled conditions (Table IV). With maximum horsepower extraction and bleed flow, the response times typically cannot exceed 125% of these values. Idle thrust is defined as the lowest attainable engine thrust, intermediate as the highest nonaugmented thrust, and maximum is defined as the highest augmented engine thrust.

Table IV. F100 Transient Thrust Requirements

Thrust Change (%)	*Idle-Intermediate*	*30% Intermediate-Intermediate*	*Idle-Maximum*	*Intermediate-Maximum*	*Maximum-Intermediate*	*Intermediate-Idle*
90	4	3.5	8	4.5	2	3
98	15	15	15	12	7	20

Note: All times are given in seconds to achieve the indicated % of thrust change for sea level-static, standard day, with no bleed flow or horsepower extraction.

For thrust increments of ±3000 lb, starting from a stabilized thrust between 25 and 45% of intermediate thrust available, the time for 90% of the thrust response shall not exceed 1.2 sec.

Combustion Stability

Primary burner fuel flow must be maintained at a sufficiently high level during engine decelerations so that no blowout of the burner can occur.

TRIM CAPABILITY.

External adjustments to the control must have sufficient range to permit the engine to produce, under standard sea level conditions, rated thrust or higher above the idle power level position; rated thrust or lower at the idle power lever position; rated specific fuel consumption or lower above the idle power lever position, and rated fuel flow or lower at the idle power lever position within the limits of the measured gas temperature, rotor speeds, airflows and engine pressure ratio associated with the ratings.

START/TRANSITION

For this program, the engine will be started using the current F100 control system. Provision must be made for transition to the multivariable control mode at idle power.

SECTION VI

FLIGHT POINT SELECTION

The flight points at which the control is to be evaluated were selected jointly by P&WA/SCI/NASA/AFAPL.

Sixteen points were chosen to fully describe the operational flight envelope, with emphasis on regions of extreme conditions of pressure, temperature and control system limitations. Basic design points were also included for system evaluation. Table V shows the selected flight condition points and the tests that will be run on each. Figures 13 and 14 show plots of each of the points as altitude/Mach number and inlet condition maps respectively.

Table V. Selected Flight Test Points

Point	Mach No.	Altitude [ft (Thousands)]	P_{t2} (atm)	T_{t2} (°R)	Criterion	Linear Model Points	SCI Design Evaluation Points	NASA Hybrid Test Points	NASA Engine Test Points
a	0	0	1.00	519	Basic Design Point	X	X	X	
b	0.9	10	1.16	562	Basic Design Point	X	X	X	X
c	0.3	20	0.49	456	Low Mn, Low Altitude	X			
d	0.6	10	0.88	519	NASA Test Point	X		X	X
e	0.6	30	0.38	442	Low Mn, Medium Altitude	X			
f	1.2	0	2.40	668	P_b Limit Point	X	X	X	
g	2.2	40	1.79	768	High Mn, Medium Altitude	X		X	X
h	0.9	45	0.25	454	Low Mn, Medium Altitude	X		X	X
j	0.9	65	0.10	454	Low P_{t2}	X		X	X
k	2.5	65	0.84	876	High Mn	X		X	
l	0.9	30	0.50	479	Basic Design Point	X	X	X	X
m	1.8	75	2.05	652	High Altitude	X		X	X
n	1.8	20	2.50	737	High Dynamic Pressure	X		X	X
p	1.8	40	1.01	643	Low Supersonic Point	X			
q	2.15	58.5	0.69	750	NASA Test Point	X		X	X
r	1.2	10	1.65	622	NASA Test Point			X	X

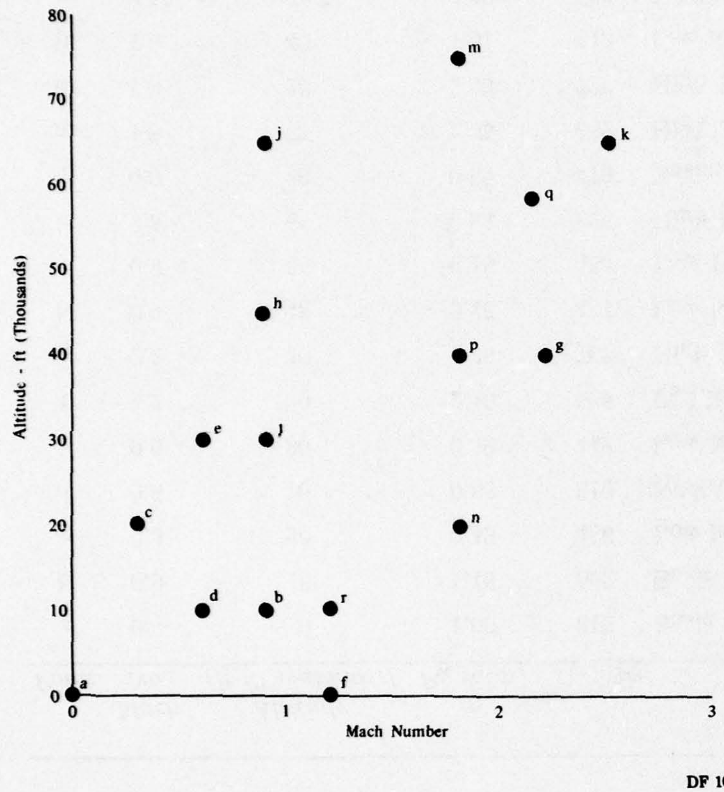


Figure 13. Selected Flight Points, Altitude vs Mach Number

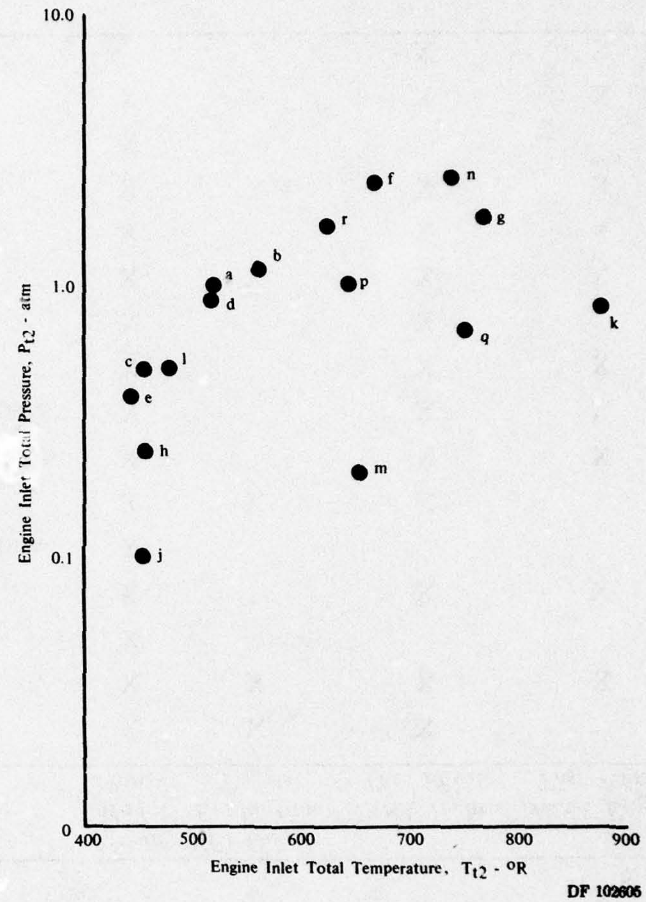


Figure 14. Selected Flight Points, P_{t2} vs T_{t2}

SECTION VII

CONTROL SYSTEM DESCRIPTION AND EVALUATION

A simplified schematic of the F100 multivariable control algorithm, developed by Systems Control, Inc. (Vt), is shown in Figure 15. This algorithm was developed using reduced order linear models derived from the sixteenth order linear models provided by P&WA. Reference schedules and limits, based on the requested power setting and flight condition, were provided for the following engine state, control, and trim variables. These were obtained by exercising the nonlinear simulation.

1. Engine State Variables

Low rotor speed (N_1)
High rotor speed (N_2)
Burner Pressure (P_b)
Augmentor pressure (P_{t6})
Main burner fuel flow (WFMB)

2. Control Variables

Main burner fuel flow (WFMB)
Exhaust nozzle area (A_j)
Compressor inlet variable vanes (CIVV)
Rear compressor variable vanes (RCVV)
Compressor bleeds (BLC)

3. Trim Variables

Fan turbine inlet temperature (FTIT)
Low rotor speed (N_1)
Fan exit $\Delta P/P$
Burner pressure (P_b)

The transition control logic operates on the reference schedules to provide a transient reference for the controller to follow for any magnitude input.

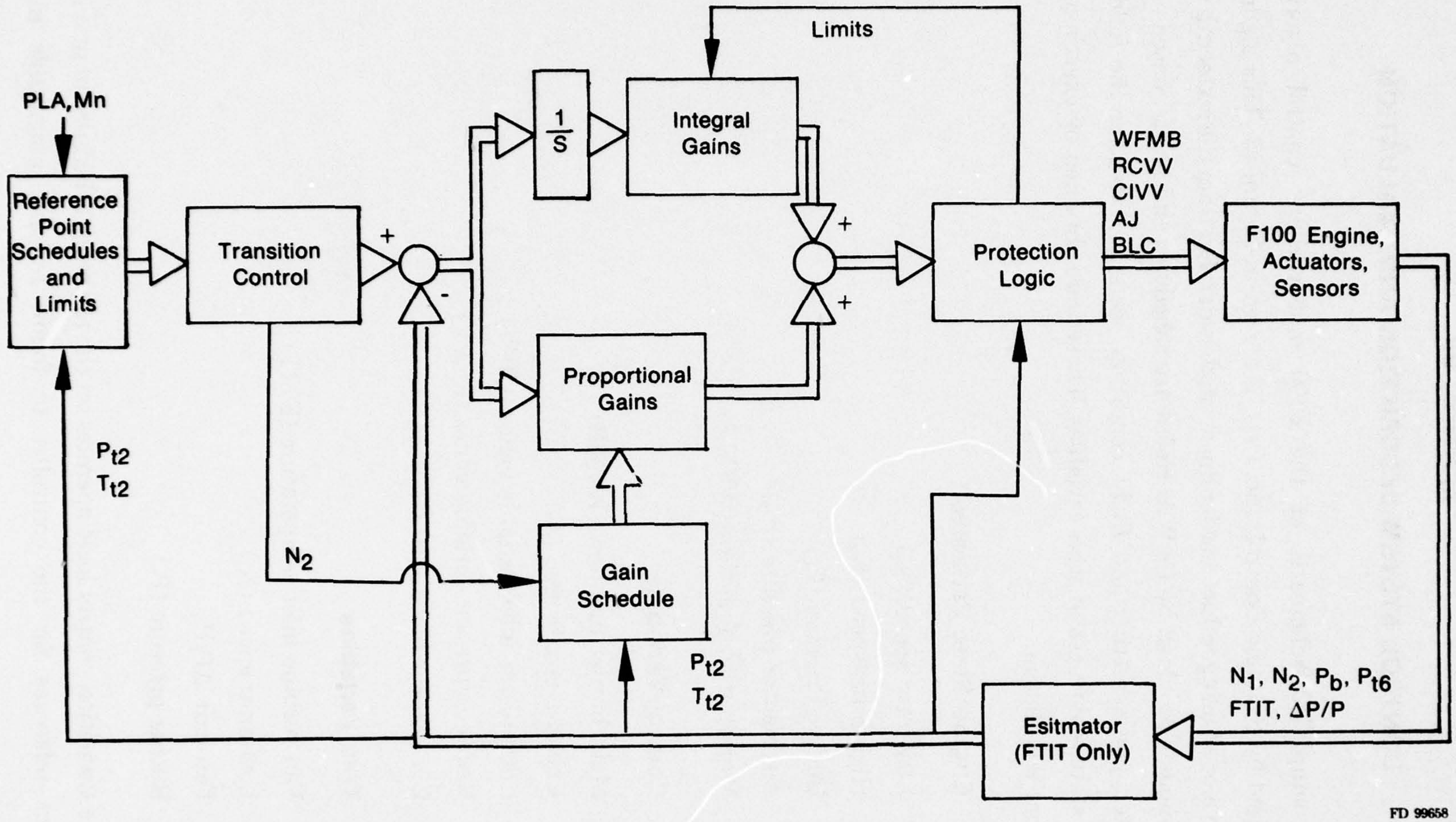


Figure 15. F100 Multivariable Control Algorithm

Transition commands, designed to avoid excessive error terms, which can lead to erroneous control action and/or saturation of controls, are calculated from an analysis of linearized engine data to provide desired rates of change on engine output variables, such as surge margin, thrust, and turbine inlet temperature.

The control mode is basically proportional plus integral with the outputs of each of these paths added to a scheduled value of each control variable. A proportional gain matrix, which forms the linear quadratic regulator (LQR), operates on error terms from all five state variables to drive all five control variables. These gains are calculated by solving the matrix Riccati equation for a performance index with weightings on both the states and the control inputs, sized to obtain the desired closed loop response. Control gains required at a given flight condition and power setting are scheduled as a function of air inlet density (P_{t2}/T_{t2}) and corrected high rotor speed ($N_2/\sqrt{\theta t_2}$). (A two-dimensional linear interpolation.)

Integral gain terms are calculated separately for trim action roughly on the order of a 1-sec time constant response. The integrators on fuel flow and nozzle area are driven by errors on engine output variables. When driven by errors on fan $\Delta P/P$ and low rotor speed, the fuel flow and nozzle area integrators operate to set the steady-state match. The CIVV, RCVV, and BLC integrators are driven to assure that the geometry returns to the proper steady-state schedule. These integrators are only allowed to operate in this fashion when the system is near steady state, which is determined by the magnitude of a high rotor speed error calculated in the "transition control" block. If FTIT or P_b limits are exceeded, the "error select logic" selects the appropriate error terms to input to the fuel flow and nozzle area integrators, and allows the fuel flow integrator to trim regardless of the magnitude of the fan speed error. The integrators are also allowed to wind down if the error terms are of the appropriate sign. The integrator logic is controlled with inputs from the engine "protection" block wherein amplitude limits for each control variable are checked and flags set for clamping appropriate integrators. Finally, deadband is applied to all integrator inputs to avoid limit cycling due to downstream hysteresis and other error sources.

The sensed value of fan turbine inlet temperature (FTIT) (output from a slow sensor), the steady-state reference value of FTIT, and a function of fuel flow are combined in the estimator block to predict whether the current combination of inputs will cause a temperature overshoot at a later point in the transient. This predicted value of steady-state temperature is then compared with the FTIT limit and, if required, the fuel flow integrator downtrims to reduce fuel flow before an overshoot can occur. In the protection block, hard limits on fuel flow and geometry excursions are provided in case of control malfunction or as part of the designated transient excursion.

A preliminary control evaluation was performed by P&WA in accordance with the 10 test items listed in Table VI. These test items include large and small power transients, inlet, and augmentor disturbances, control operation on engine limits, and with the area saturated, and steady-state operation in the presence of deterioration, power extraction and bleed extraction. This preliminary evaluation was established to test the multivariable control on the nonlinear digital simulation prior to the NASA-LeRC evaluation on the hybrid simulation and the test engine. The NASA hybrid simulation plans include more extensive testing over the entire engine envelope.

In general, the large amplitude acceleration and deceleration transients met the specific time response requirements. The surge margins for these transients occasionally dipped slightly below the F100 Bill-of-Material (BOM) control margins, but not significantly. In fact, as illustrated in Figure 16, during most of the transient there is stall margin available for achieving even more rapid responses. The turbine temperature was well controlled. A typical idle to intermediate transient is presented in Figure 16. The control responded well to the large amplitude "Bodie" Power lever command.

Small perturbation response requirements are not specified in the control criteria but the guideline of 90% thrust in 1.2 sec was used as a measure of goodness. The small amplitude responses that were obtained initially showed that considerable potential existed for achieving faster part power transients.

Table VI. Control Evaluation

	Test Item	Input Specification	Flight Condition SLS	0.9/10K	0.9/30K
1.	Large Transient Response (5 to 10 sec each)	• Idle to Intermediate • Intermediate to Idle • "Bodie" Transient • ΔPLA 3000 lb below Intermediate to Intermediate	X X X X	X X --- ---	X X --- ---
2.	Small Amp Transient Response (2 to 3 sec)	+3 deg PLA	At PLA of 20, 52, 80 deg	80 deg (Intermediate)	80 deg (Intermediate)
3.	No Holds Barred PLA (10 sec)	2 Runs	X		
4.	Disturbances (2 to 3 sec)	$\Delta P_{t_7} = 4\%$ $\Delta P_{t_2} = 1\%$	83 deg (Intemediate) 83 deg (Intermediate)	--- ---	--- ---
5.	Transient Limit Check • P_b Limited (FTIT = Limit Is Addressed in Item 1) (2 to 3 sec)	• Set P_b 10 psi Below Intermediate Setting • ΔPLA = 10 deg	10 deg PLA Input at 73 deg	---	---
6.	Transient Saturation Check - A_j = Constant	A_j Limited	Near Intermediate	---	---
7.	Idle Die Out Check	Maximum HPX + BLC Specified	Idle ΔPLA = 20 to 35 deg	---	---
8.	Deterioration (See Table VII)	0 to ½ Nominal - Nominal Specified	83 deg Steady State	---	---
9.	Power Extraction (See Table VII)	0 to ½ Nominal - Nominal Specified	83 deg Steady State	---	---
10.	Bleed Extraction (See Table VII)	0 to ½ Nominal - Nominal Specified	83 deg Steady State	---	---

Note: 20 deg PLA = Idle thrust
83 deg PLA = Intermediate (maximum nonaugmented) thrust
130 deg PLA = Maximum augmented thrust.

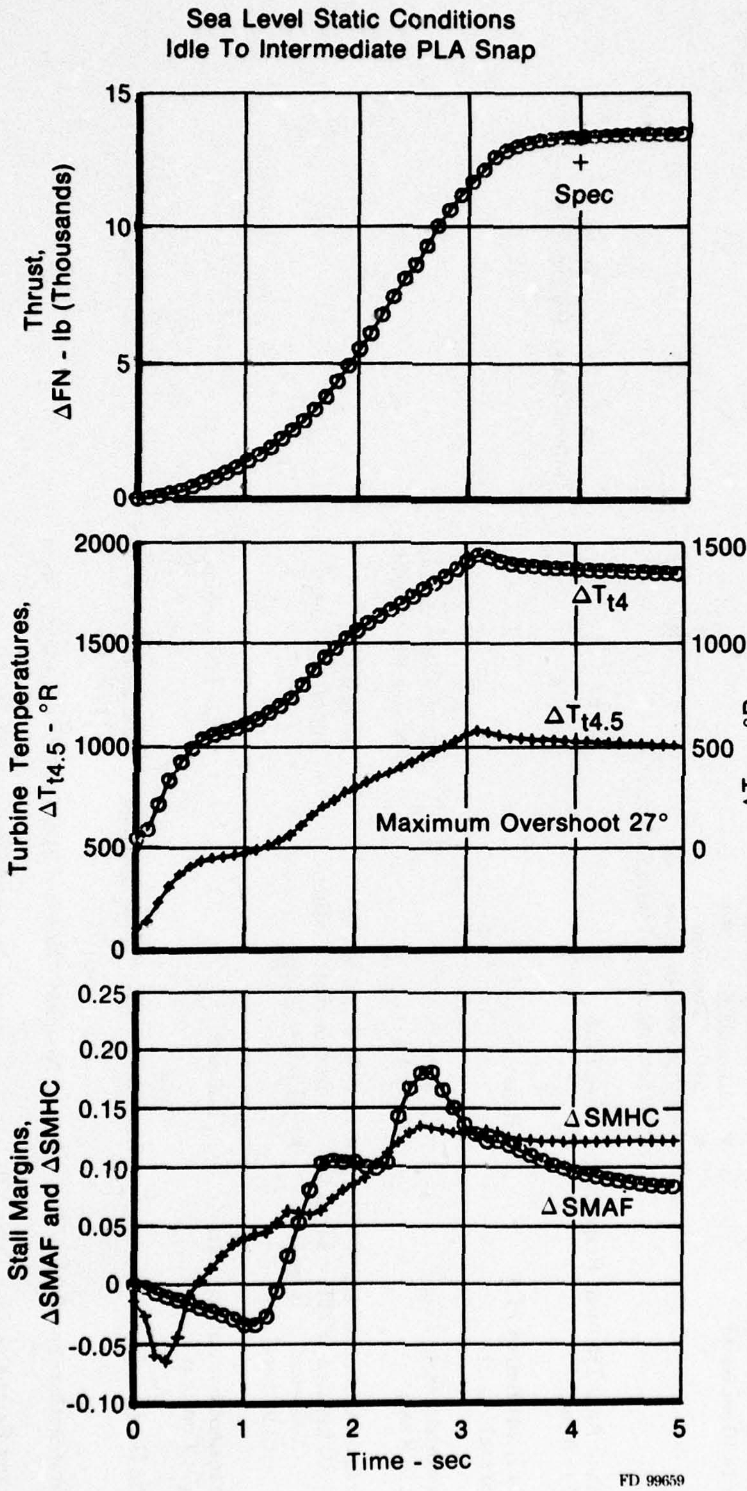


Figure 16. Typical Idle-to-Intermediate Transient

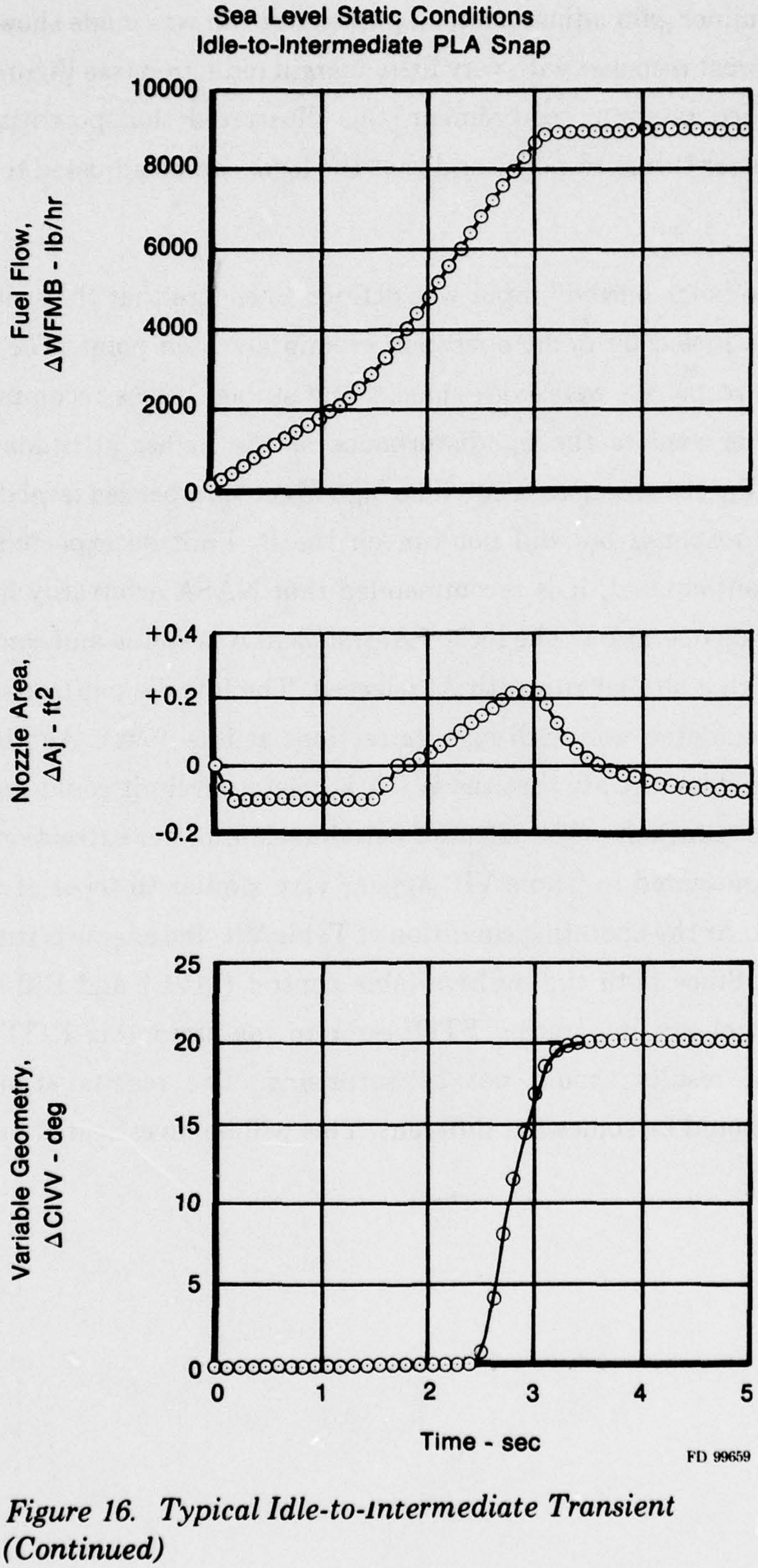


Figure 16. Typical Idle-to-Intermediate Transient (Continued)

With a few minor gain adjustments, a part power run was made showing a much improved thrust response with very little margin reduction (see Figure 17). While not a specified program requirement, this illustrated that potential exists for achieving faster thrust response and that the logic can be adjusted to obtain this response.

The "no holds barred" input was defined to ensure that the switching logic could not be fooled by cyclic operation around a switch point. The P_{t2} and P_{t7} disturbance responses were both smooth and stable. It was recommended that NASA further explore the P_{t7} disturbance at the higher atltitude conditions where large P_{t7} disturbances occur. The high Mach number sea level data showed good thrust response but did not run on the P_b limit as expected. While no problem is anticipated, it is recommended that NASA arbitrarily lower the P_b limit to test its operation. The locked A_j transient was stable and compared very favorably with a similar run with A_j released. The idle die out test showed that the control operated well with high extractions at idle power. Another test was performed to demonstrate that the W_f/P_b acceleration limit could provide surge protection in transients. The effect of deterioration, power extraction and bleed extraction, presented in Table VII, appear very similar to those of the current F100 control. At the operating condition of Table VII, the engine is running on an FTIT limit. Since both the multivariable control (MVC) and Bill-of-Material (BOM) control are integrating FTIT error to maintain this FTIT limit, the similarity of results should not be surprising. The results at other flight conditions should be somewhat different. This will be investigated in the NASA hybrid tests.

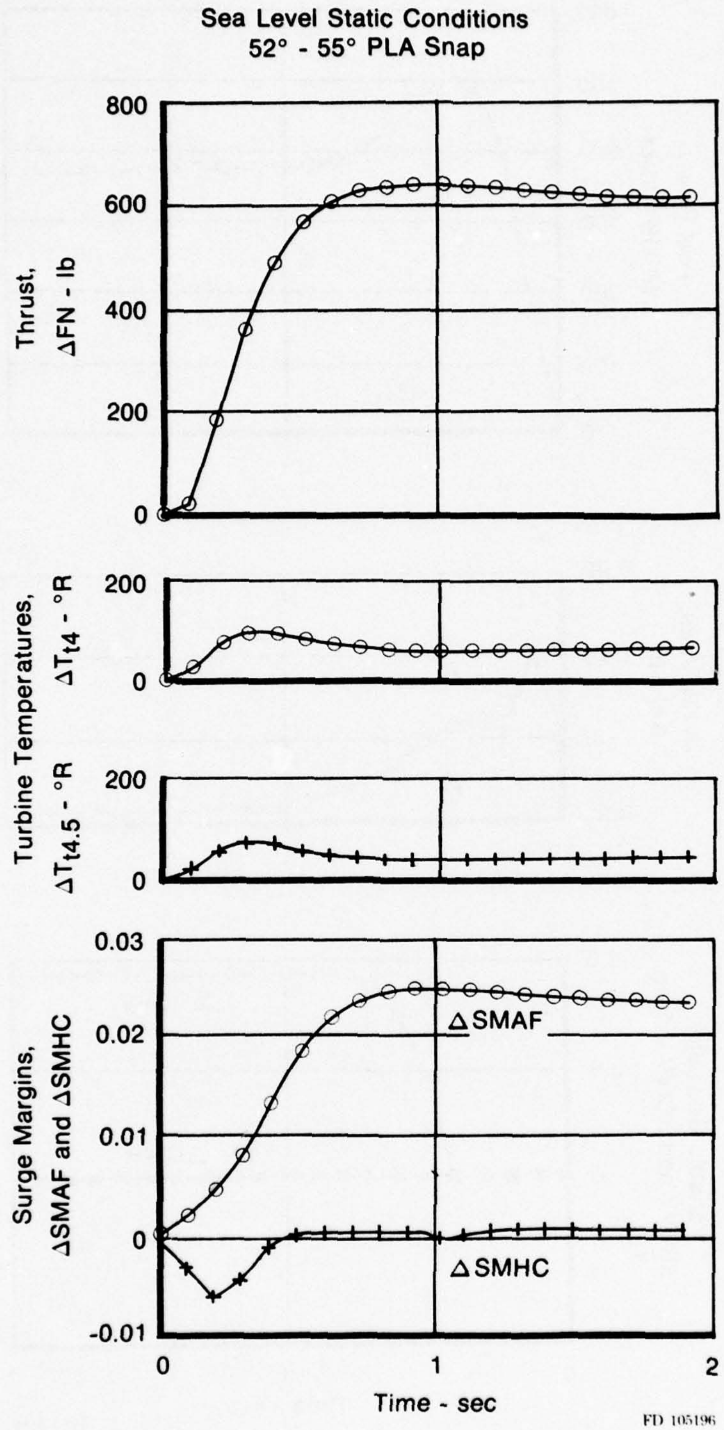


Figure 17. Typical Small Amplitude Part Power Transient

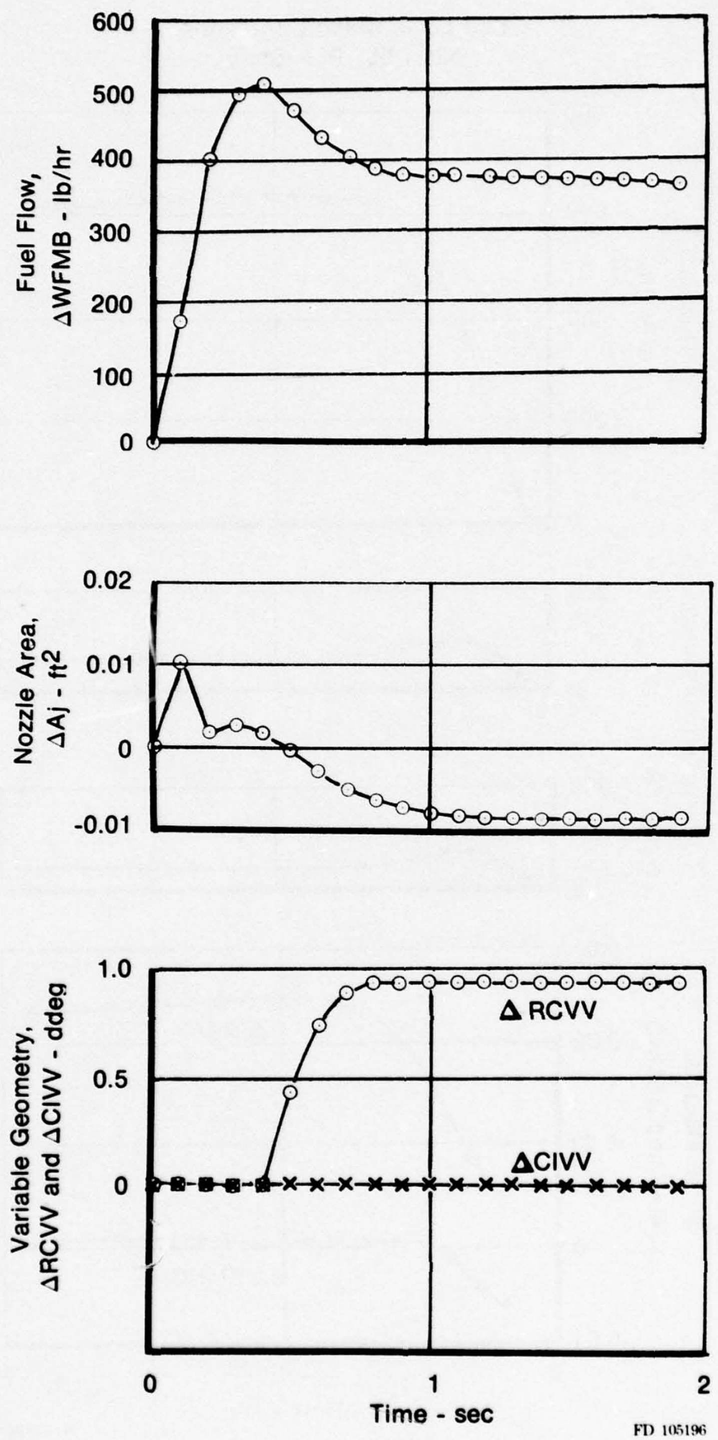


Figure 17. Typical small Amplitude Part Power Transient (Continued)

Table VII. Deterioration/Power Extraction/Bleed Effects

Flight Point: Alternate = OK
PLA = 83 (Intermediate)

Evaluation Item (See Table VI)	*Case*	ΔThrust* *MVC*	ΔThrust* *BOM*	ΔTSFC* *MVC*	ΔTSFC* *BOM*
8. Deterioration	0	0	0	0	0
	½ Nominal	− 4.27	− 2.71	+0.30	+0.26
	Nominal	− 8.94	− 7.22	+0.97	+0.92
9. Power Extraction	0	0	0	0	0
	½ Nominal	− 0.11	+ 0.12	+0.04	+0.04
	Nominal	− 0.12	+ 0.15	+0.09	+0.09
10. Bleed Extraction	0	0	0	0	0
	½ Nominal	− 6.86	− 7.01	+2.91	+2.89
	Nominal	−14.51	−16.93	+6.30	+6.65
All Effects	---	−25.20	−24.85	+8.95	+9.07

*Steady State

Nominal Effects - Deterioration: $\Delta\eta_{fan} = -1\%$, $\Delta\eta_{comp} = -2\%$, $\Delta\eta_{High\ Turbine} = -2.5\%$

Power Extraction: HPX = 65 hp

Bleed Extraction: 6% of Compressor Airflow

SECTION VIII

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

It is concluded that the statement of work for phase one of the contract has been satisfied by delivering the data necessary to support both NASA Lewis Research Center and Systems Control, Inc. (Contract No. F33615-75-C-2053). Work accomplished in meeting these requirements included the following items:

- *Dynamic Simulation Delivered* - NASA and SCI each have been provided an identical operational F100 dynamic simulation. Support has been provided to assure proper installation of this simulation on the NASA and SCI computers. The NASA simulation will be used as a basis for development of the hybrid engine simulation. The SCI simulation will be used as a model for control design and verification. The simulation was updated for multivariable control interfacing and includes conventional F100 control logic for comparative purposes.

- *Linear Models Generated* - Linear models of the form

  $$\dot{X} = AX + BU$$
  $$Y = CX + DU$$

  were generated and verified against the F100 dynamic simulation. The models include all the dynamic terms (16 states) currently represented in the F100 dynamic simulation. Matrix coefficients were generated using an offset derivative method with a forced steady-state match. This technique was selected over two other candidate techniques because of inherent steady-state accuracy and reduced computer run time. Models of the sensors and actuators were also provided, both in a nonlinear and linear format.

- *Controls Criteria Provided* - Detailed control criteria and goals for protection, stability, compatibility, performance, accuracy, transients, and trim were provided. The criteria proved adequate for all areas of control except the small amplitude response. In cases where aircraft operations depend on engine response, such as V/STOL, rapid transient responses would be more critical.

The expected variations in engine characteristics due to production differences and component degradation over the operating life of the engine were also provided.

- *SCI and NASA Lewis Research Center Supported* - Systems Control, Inc., has been supported throughout the control synthesis process. This support included such areas as definition of control variables, selection of state variables, and determination of significant dynamic elements.

  NASA Lewis Research Center has been supported in developing the realtime, hybrid computer engine simulation. Assistance has been provided in defining the sensor and actuator interface requirements needed to run the F100 engine with the NASA computer/controller.

- *Control Evaluated* - A preliminary control evaluation was performed on the nonlinear simulation using the control criteria as a guide. Large amplitude transient time and protection criteria were met. There appears to be margin for more responsive control action if required.

RECOMMENDATIONS

This program is directed toward the evaluation of advanced engine control techniques on a test cell engine at the NASA Lewis Research Center. It is recommended that future work include flight testing of these concepts on a vehicle such as the F-15 at the NASA Dryden Flight Research Center.

This program addressed the application of advanced control techniques to a nonaugmented engine control system. It is recommended that future work extend these techniques to include (1) the entire propulsion system, i.e., the engine (including augmentation) and the inlet, and (2) the combined flight and propulsion control systems.

The linear models provided for this program were generated based on the dynamics of the nonlinear F100 simulation. It is recommended that future work include development of techniques for generation of dynamic models directly from engine data.

SECTION IX

REFERENCES

1. Beattie, E.C., "Control Mode Studies for Advanced Variable Geometry Turbine Engines," AFAPL TR-75-7, November 1974.

2. Bentz, C.E., J.R. Zeller, "Integrated Propulsion Control System Programs," SAE Paper 730359, April 1973.

3. Michael, G.J., and F.A. Farrar, "An Analytical Method for the Synthesis of Nonlinear Multivariable Feedback Control," ONR Report M941338-2, June 1973.

4. Skira, C.A. "The Role of Multivariable Control Techniques in the Design of Turbine Engine Control Systems," Joint Automatic Control Conference, July 1976.

5. Beattie, E.C., and W.R. Spock, "Application of Multivariable Optimal Control Techniques to a Variable Area Turbine Engine," Joint Automatic Control Conference, July 1976.

6. DeHoff, R.L., and W.E. Hall, "Multivariable Control Design Principles With Application to the F100 Turbofan Engine," Joint Automatic Control Conference, July 1976.

APPENDIX A

NOMENCLATURE

ENGINE/CONTROL PARAMETERS

A	-	Area, in.^{2}
A_j	-	Exhaust Nozzle Area, ft^2
BLC	-	Customer Compressor Bleed Flow Fraction
CIVV	-	Compressor Inlet Variable Vanes, deg
Cp	-	Specific Heat, Btu/lb °R
FN	-	Thrust, lb
FTIT	-	Fan Turbine Inlet Temperature, °R
GVIPOS	-	Compressor Inlet Variable Vanes, deg
H	-	Enthalpy, Btu/lb
h	-	Film Coefficient, Btu/(°R in.^{2} sec)
HVPOS	-	Rear Compressor Variable Vane, deg
J	-	Polar Moment of Inertia, ft-lb-sec^2
KA2	-	Distortion Constant
M	-	Mass, lb
Mn	-	Mach Number
P_b	-	Burner Pressure
N_1	-	Fan Rotor Speed, rpm
N_2	-	Compressor Rotor Speed, rpm
P_{amb}	-	Ambient Pressure, psia
PLA	-	Power Lever Angle
PR	-	Pressure Ratio
PRMA	-	Mass Average Pressure Ratio
P_{t2}	-	Engine Inlet Total Pressure, psia
$P_{t2.5}$	-	Fan Discharge Pressure, psia
P_{t3}	-	Compressor Discharge Pressure, psia
$P_{t4.5}$	-	Interturbine Volume Pressure, psia
P_{t7m}	-	Augmentor Pressure, psia
Q	-	Torque, ft-lb
R	-	Gas Constant, ft/°R

RCVV	-	Rear Compressor Variable Vanes, deg
S	-	Laplace Operator
SMAF	-	Fan Stall Margin
SMHC	-	Compressor Stall Margin
SNCOM	-	Compressor Rotor Speed, rpm
SNFAN	-	Fan Rotor Speed, rpm
TC	-	Turbine Cooling Airflow, lb_m/sec
T_{in}	-	Inlet Temperature, °R
TL	-	Leakage Airflow, lb/sec
T_{t2}	-	Engine Inlet Total Temperature, °R
$T_{t2.5c}$	-	Fan Outer Diameter Discharge Temperature, °R
$T_{t2.5h}$	-	Fan Inner Diameter Discharge Temperature, °R
T_{t3}	-	Compressor Discharge Temperature, °R
T_{t4hi}	-	Burner Exit Fast Response Temperature, °R
T_{t4lo}	-	Burner Exit Slow Temperature, °R
T_{t4}	-	Burner Exit Total Temperature, °R
$T_{t4.5hi}$	-	Fan Turbine Inlet Fast Response Temperature, °R
$T_{t4.5lo}$	-	Fan Turbine Inlet Slow Response Temperature, °R
T_{t5}	-	Fan Turbine Exit Temperature, °R
T_{t6c}	-	Duct Exit Temperature, °R
T_{t6M}	-	Augmentor Mixed Inlet Temperature, °R
T_{t7m}	-	Augmentor Exit Temperature, °R
V	-	Volume, ft^3
Vj	-	Jet Velocity, ft/sec
W	-	Mass Flow, lb/sec
Wa	-	Airflow, lb_m/sec
WAD	-	Duct Airflow, lb/sec
Wf	-	Fuel Flow, lb/hr
W_{fa}	-	Augmentor Fuel Flow, lb/hr
WFAN	-	Total Engine Airflow, lb/sec
WFMB	-	Fuel Flow Main Burner, lb/hr
W_{fp}	-	Primary Fuel Flow
WFTI	-	Fan Turbine Inlet Flow, lb/sec

Wg	-	Gas Flow, lb/sec
WHPT	-	High Pressure Turbine Flow, lb/sec

SYMBOLS

γ	-	Ratio of Specific Heats
δ	-	Corrected Pressure
Δ	-	Change
ϵ	-	Small Shift
ζ	-	Damping Ratio
η	-	Efficiency
θ	-	Corrected Temperature
τ	-	Time Constant
ω_n	-	Natural Frequency

MISCELLANEOUS

ALT	-	Altitude
AFAPL	-	Air Force Aero Propulsion Laboratory
C	-	Cold (Fan OD)
COM	-	Compressor
CT	-	Compressor Turbine
EEC	-	Engine Electronic Control
F	-	Fan
FT	-	Fan Turbine
H	-	Hot (Fan ID)
ID	-	Inside Diameter
LQR	-	Linear Quadratic Regulator
MVC	-	Multivariable Control
NASA	-	National Aeronautics and Space Administration
OD	-	Outside Diameter
P&WA	-	Pratt & Whitney Aircraft
RC	-	Rear Compressor
SCI	-	Systems Control, Inc. (Vt)
SLS	-	Sea Level Static

SM	-	Stall Margin
TOT	-	Total
UFC	-	Unified Fuel Control
V/STOL	-	Vertical/Short Takeoff and Landing

UNITS OF MEASURE

Btu	-	British Thermal Unit
Deg	-	Degrees
°R	-	Degrees Rankine
hr	-	Hours
lb	-	Pounds
ft²	-	Square Feet
psia	-	Pounds per Square Inch, Absolute
rpm	-	Revolutions Per Minute
sec	-	Seconds

APPENDIX B

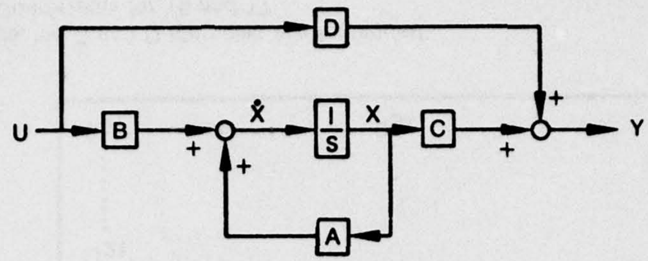
LINEAR MODEL DATA POINTS

Code	Point No.	Mach No.	Altitude ft (Thousands)	PLA (deg)	Comments
Basic Set	1	0	0	20	SLS Idle
	2	0	0	36	
	3	0	0	52	
	4	0	0	67	
	5	0	0	83	SLS Intermediate
Group I	1	0	0	24	
	2	0.9	10	83	
	3	0.3	20	24	
	4	0.6	10	20	
	5	0.6	30	24	
Group II	6	1.2	0	83	
	7	2.2	40	83	
	8	0.9	45	130	Maximum Augmentation
	9	0.9	65	83	
	10	2.5	65	130	Maximum Augmentation
Extra	1	0.9	10	36	
	2	0.9	10	52	
	3	0.9	10	67	Added $\Delta P/P$ to Output for All the Following Runs
	4	0.9	10	83	
	5	0.9	30	36	
	6	0.9	30	52	
	7	0.9	30	67	
Group III	1	0	0	20	Deletd
	2	0	0	20	With BLD/HPX Extraction
	3	0	0	83	Deleted
	4	0.9	10	20	
	5	0.9	30	20	
	6	0.9	30	83	
Group IV	1	0.9	45	83	
	2	0.9	45	52	
	3	0.9	45	40	Low P_b
	4	1.8	75	83	
	5	1.8	20	83	
	6	0.3	20	83	
	7	1.8	40	83	
	8	2.5	65	83	High Mn
	9	2.15	58.5	83	

The linear F100 model provided is of the form:

$$\dot{X} = AX + BU$$
$$Y = CX + DU$$

$$\dot{X} = \frac{dx}{dt}$$



1. Engine State Variables

X_1 = Fan Speed, SNFAN (N_1) - rpm

X_2 = Compressor Speed, SNCOM (N_2) - rpm

X_3 = Compressor Discharge Pressure, P_{t3} - psia

X_4 = Interturbine Volume Pressure, $P_{t4.5}$ - psia

X_5 = Augmentor Pressure, P_{t7m} - psia

X_6 = Fan Inside Diameter Discharge Temperature, $T_{t2.5h}$ - °R

X_7 = Duct Temperature, $T_{t2.5c}$ - °R

X_8 = Compressor Discharge Temperature, T_{t3} - °R

X_9 = Burner Exit Fast Response Temperature, T_{t4hi} - °R

X_{10} = Burner Exit Slow Response Temperature, T_{t4lo} - °R

X_{11} = Burner Exit Total Temperature, T_{t4} - °R

X_{12} = Fan Turbine Inlet Fast Response Temperature, $T_{t4.5hi}$ - °R

X_{13} = Fan Turbine Inlet Slow Response Temperature, $T_{t4.5lo}$ - °R

X_{14} = Fan Turbine Exit Temperature, T_{t5} - °R

X_{15} = Duct Exit Temperature, T_{t6c} - °R

X_{16} = Duct Exit Temperature, T_{t7m} - °R

2. Engine Inputs

U_1 = Main Burner Fuel Flow, WFMB - lb/hr

U_2 = Nozzle Jet Area, A_j - ft²

U_3 = Inlet Guide Vane Position, CIVV - deg

U_4 = High Variable Stator Position, RCVV - deg

U_5 = Customer Compressor Bleed Flow, BLC - %

3. Engine Outputs

Y_1 = Engine Net Thrust Level, FN - lb

Y_2 = Total Engine Airflow, WFAN - lb/sec

Y_3 = Turbine Inlet Temperature, T_{t4} - °R

Y_4 = Fan Stall Margin, SMAF

Y_5 = Compressor Stall Margin, SMHC

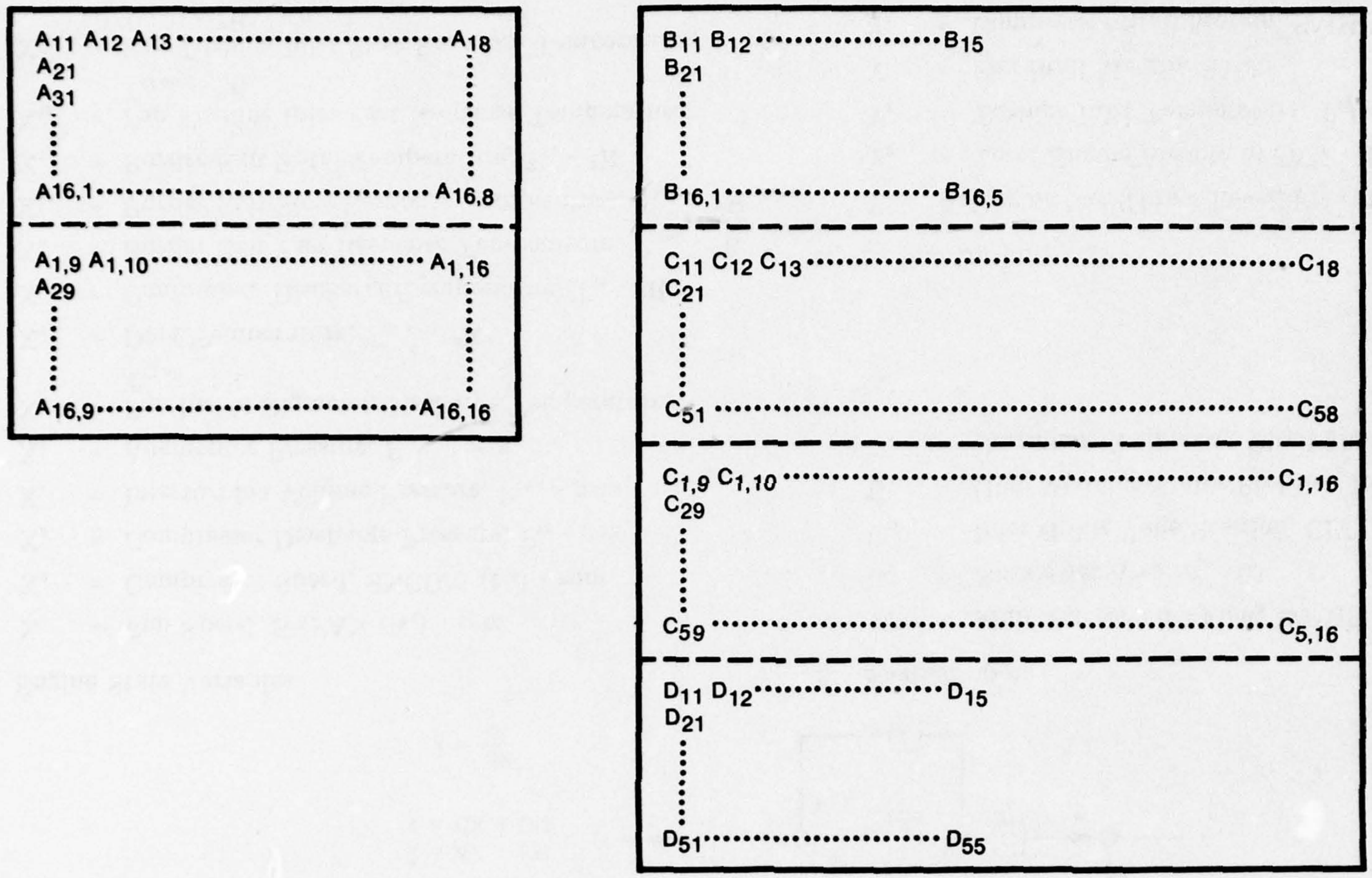
Y_6 = Fan Exit $\Delta P/P$, $(P_{t2.5} - P_{s2.5})/P_{s2.5}$, based on test data

Y_7 = Fan Exit $\Delta P/P$, $(P_{t2.5} - P_{s2.5})/P_{s2.5}$, theoretical function of area and airflow.

LINEAR MODEL DATA FORMAT

First Page of Each Data Set
The A Matrix

Second Page of Each Data Set
The B, C and D Matricies



Note: In Later Models, the C and D Matricies Are Expanded
To Include Linear Coefficients for Y6 and Y7

FD 105197

BASIC POINT NO. 1

P100 MODEL-MN=0.0, ALT=0.0, PLA=20- .5PC PERTX,3PC PERTU,8/28/75 FAA

THE A MATRIX

-2.324	1.001	-20.30	636.3	-1184.	-15.22	-3.313	-1.595
-.5473	-3.838	140.5	-266.6	-148.7	27.39	-1.020	-1.219
1.200	5.722	-147.6	38.23	326.3	-51.92	2.197	2.077
.4404	.3985	119.0	-777.1	666.5	-1.003	1.814	.6040
.6532E-02	-.1497E-01	.4554E-01	2.509	-23.79	.1159	-.1904E-01	-.1195E-01
.4243	-.2302	5.677	9.255	120.1	-16.73	.8144	.2988
.3760	-.3872	7.654	11.51	148.0	4.882	-18.99	.3688
-.4527	-.6762	50.43	-9.255	-123.4	34.62	-.8109	-20.29
-.1007E-01	-.2285E-01	-.3674	-.3259	-3.035	.4452	-.1744E-01	6.107
-.1510E-03	-.3400E-03	-.5789E-02	-.5793E-02	-.4654E-01	.6570E-02	-.2906E-03	.9046E-01
-5.070	-22.87	126.4	-110.9	-1377.	220.9	-9.617	37.62
.7235E-01	.3996	-193.2	640.7	20.03	-2.382	.1308	9.508
.3196E-02	.1776E-01	-8.587	28.47	.8862	-.1060	.5755E-02	.4225
.6442E-01	.1070	-86.48	67.08	295.5	.1902E-01	-.4534E-01	4.226
-.6291E-02	.4495E-01	-.2405	.1738	3.824	-.3838	19.93	.8690F-01
-2.501	4.196	-11.12	608.4	12.29	-38.37	2.245	.3709E-01

-.5795	-7.419	-1.892	1.510	-7.487	-1.097	-2.643	-1.441
3.370	1.769	-1.538	-.3029	-2.685	-.2755	-.6780	-.3850
.4898	4.470	2.008	.6510	5.859	.5946	1.469	.8400
-.1069	5.464	2.333	.9268	8.300	.9401	1.947	1.190
-.2975E-02	-.5028E-01	-.1675E-01	-.7689E-02	-.6503E-01	.9779F-02	.2400E-02	-.8801E-02
.1863	1.707	.1767	.2532	2.238	.2335	.5633	.3208
.2346	2.111	.2190	.3074	2.767	.2868	.6902	.4002
-.1849	-1.695	-.1738	-.2468	-2.222	-.2265	-.5494	-.3185
-50.00	-.7761E-01	39.67	-.1130E-01	-.1017	-.1312E-01	-.1304E-01	-.1458E-01
-.6667	-.6679	.5877	-.1808E-03	-.1628E-02	-.2040E-03	-.2318F-03	-.2333E-03
-2.213	-20.16	-50.08	-2.952	-26.43	-2.700	-6.572	-3.780
-9.329	-9.717	34.03	-49.95	.2848	.4372E-01	.9997E-01	.4083E-01
-.4146	-.4321	1.734	-1.998	-1.988	.1924E-02	.4346E-02	.1750E-02
-4.216	-4.601	17.51	-1.421	-1.595	-19.99	.6085F-01	-.3033F-01
.3449F-02	.3104E-01	.1607E-01	.9042E-02	.8138E-01	.3498E-02	-19.99	.5833E-02
.9210	3.601	-2.184	.4318	3.947	24.84	27.49	-49.47

```
THE B MATRIX
 4.757     -70.04     -10.21      .9181     -5967.
 .1020     -83.18     -2.352     -49.43      1259.
-.9829      124.8      5.464      32.03     -9682.
-3.437      75.77      3.614      2.728      4199.
 .2560E-01-20.11      .3921E-01-.5871E-01-19.39
-1.115      20.82      .9273      .2518      1369.
-1.275      24.50      1.524     -4.088      1158.
 1.435      13.15     -2.335      17.53     -2993.
 .8773E-01-3.846     -.4909E-01-.1489     -3328.
 .1365E-02-.5907E-01-.7528E-03-.2307E-02-49.43
 34.21     -678.6     -22.48     -80.44      .5013E+05
-1.572     -90.05      .7008      34.78      2962.
-.6969E-01-4.001      .3106E-01 1.545      131.2
-.6398     -53.85      .5859      18.00      1853.
-.1674E-01 1.204     -.5057E-01 .2028      9.111
-1.061      98.66     -16.99      19.48     -220.6

THE C MATRIX
 .1317     -.2901      1.353      50.23      295.7      2.304     -.3240     -.2034
 .1736E-01 .2246E-02-.5469E-01-.9097E-01-1.165     -.3177E-01-.7913E-02-.2878E-02
 .0         .0         .0         .0         .0         .0         .0         .0
-.2908E-04 .7187E-04-.1750E-02-.2903E-02-.3728E-01-.1017E-02-.2529E-03-.9177E-04
 .1924E-03 .1826E-02-.2249E-01 .4292E-02 .5220E-01-.1710E-01 .3729E-03 .1358E-03

-.3301E-01-.7333     -.3141     -.1177     -1.131      .2143      .9153E-01-.1711
-.1822E-02-.1661E-01-.1709E-02-.2427E-02-.2179E-01-.2219E-02-.5395E-02-.3117E-02
 .0         .0         1.000      .0         .0         .0         .0         .0
-.5811E-04-.5299E-03-.5454E-04-.7755E-04-.6968E-03-.7083E-04-.1725E-03-.9941E-04
 .8595E-04 .7825E-03 .8070E-04 .1142E-03 .1028E-02 .1048E-03 .2547E-03 .1469E-03

THE D MATRIX
 .4406     -24.89      .8098     -1.881     -432.8
 .1049E-01-.1925      .1035      .2537E-01-8.876
 .0         .0         .0         .0         .0
 .3262E-03-.6225E-02-.4097E-02 .4694E-03-.3446
 .2692E-03 .6171E-01 .6621E-03-.1584E-01-2.181
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BASIC POINT NO. 2

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THE A MATRIX

-3.348	.7209	-.9919	439.1	-756.2	-9.752	-2.787	-.8010
-1.007	-2.794	113.2	-228.6	-95.93	12.33	-1.147	-1.408
2.986	4.596	-159.0	-15.49	290.8	-56.14	3.599	2.114
.7145	.2148	121.5	-528.4	325.7	-1.878	3.151	.4707
.1765E-01	-.7504E-02	.2009	2.193	-9.609	.1385	.4289E-02	.8188E-02
.4782	-.1500	.5469	-1.756	37.29	-18.34	.4510	-.6276E-01
.2452	-.3196	1.276	-3.491	81.89	3.771	-19.01	-.1330
-.7945	-.2846	43.44	3.738	-79.21	38.29	-1.021	-19.86
-.2247E-01	-.7146E-02	.2949	.1549	-1.841	.4429	-.1519E-01	6.082
-.3333E-03	-.1072E-03	.4289E-02	.2065E-02	-.2743E-01	.6512E-02	-.2531E-03	.9009E-01
-5.933	-8.559	66.05	27.63	-585.2	112.4	-7.415	41.02
.7594E-02	-.2760	-87.10	318.8	1.299	-.8707E-01	.5695E-01	9.216
.3417E-03	-.1227E-01	-3.871	14.17	.6063E-01	-.3786E-02	.2582E-02	.4096
-.8024E-01	-.1799	-39.50	32.49	226.9	.5906	-.1048	4.183
-.8860E-02	.2037E-01	-.1555	-.1033	2.122	-.2590	19.92	.8258E-01
-2.663	1.282	-9.476	164.2	88.56	-18.13	1.644	-1.268

.5167	-.5694	-2.553	5.688	4.164	-.6952	-.5821	-.2512
7.771	8.873	-2.593	.1886	1.602	.1832	.2419	.2463
-.3796	-3.416	2.896	-.5125	-4.421	-.5084	-.6123	-.6749
-.8488	6.880	4.350	1.303	11.66	1.562	2.790	1.798
.1488E-01	.8530E-01	-.1443E-01	.1171E-01	.1064	.4920E-01	.5941E-01	.1665E-01
-.4323E-01	-.3654	-.3455E-01	-.5837E-01	-.5254	-.5383E-01	-.6955E-01	-.7587E-01
-.8646E-01	-.7497	-.7182E-01	-.1167	-1.051	-.1114	-.1285	-.1557
.9121E-01	.8209	.7546E-01	.1232	1.064	.1241	.1315	.1636
-50.00	.3559E-01	39.69	.5339E-02	.6407E-01	.7476E-02	.0	.9853E-02
-.6666	-.6662	.5880	.7119E-04	.8542E-03	.9968E-04	.0	.1314E-03
.6735	6.038	-47.42	.9148	7.720	.8896	.9563	1.180
-10.38	-10.36	39.29	-50.00	.9610E-01	.1121E-01	.2268E-01	.1478E-01
-.4615	-.4598	1.746	-2.000	-1.996	.5233E-03	.1058E-02	.6897E-03
-4.750	-4.849	17.91	-2.795	-2.883	-19.81	-.4687E-01	-.2168E-01
-.2636E-02	-.2372E-01	.1227E-01	-.3559E-02	-.3203E-01	.1495E-02	-20.00	-.2956E-02
.5667E-01	-4.235	-2.715	-.7332	-6.583	25.19	23.60	-51.01

THE B MATRIX

.4855	-170.4	-50.84	.5485	-1865.
-.4131	93.37	-9.824	-46.72	4835.
1.551	-221.7	28.72	9.503	-.3489E+05
-2.426	816.5	9.927	12.15	.1166E+05
-.2224E-01	-47.03	.3109	.1484E-01	88.23
.6749E-01	-27.93	3.519	-.7058	-292.9
.1582	-57.06	7.240	-2.007	-688.9
-.4216	42.34	-7.516	25.61	2459.
.4434E-01	2.901	-.2147	-.1022E-01	-4218.
.6725E-03	.4039E-01	-.3210E-02	-.1498E-03	-62.59
9.978	376.0	-57.35	-16.36	.7064E+05
.1026	2.145	.8349E-01	.5649	-5151.
.4501E-02	.1074	.3852E-02	.2502E-01	-228.8
.9296E-01	2.927	.3394	.2215	-2259.
.6414E-02	-1.359	-.1848	.5420E-01	-38.73
1.518	-353.5	-42.56	-.8908	-6028.

THE C MATRIX

.5737	-.3506	3.590	66.64	166.9	4.108	-.9670	-.3006
.3245E-01	.3038E-02	-.1190E-01	.3460E-01	-.8130	-.3623E-01	-.9866E-02	.1311E-02
.0	.0	.0	.0	.0	.0	.0	.0
.7177E-04	.5556E-04	-.2079E-03	.6270E-03	-.1421E-01	-.6336E-03	-.1723E-03	.2377E-04
.1261E-03	.5161E-03	-.6621E-02	-.5910E-03	.1251E-01	-.4716E-02	.1598E-03	-.2231E-04
.1594	-.2885	-.8779	-.7005E-01	-.6919	1.228	1.028	-.1167
.8501E-03	.7621E-02	.7060E-03	.1150E-02	.1035E-01	.1126E-02	.1314E-02	.1580E-02
.0	.0	1.000	.0	.0	.0	.0	.0
.1541E-04	.1380E-03	.1282E-04	.2087E-04	.1879E-03	.2041E-04	.2349E-04	.2859E-04
-.1453E-04	-.1301E-03	-.1207E-04	-.1960E-04	-.1687E-03	-.1925E-04	-.2110E-04	-.2573E-04

THE D MATRIX

.1340	-232.0	9.211	-2.127	-403.2
-.1480E-02	.4962	.4550	.9854E-02	3.319
.0	.0	.0	.0	.0
-.3046E-04	.1180E-01	-.1686E-02	.2131E-03	.7997E-01
.6918E-04	-.7215E-02	.1196E-02	-.9428E-02	-.4331

P100 MODEL-MN=0.0, ALT=0.0, PLA=52- .5PC PERTX,3PC PERTU,8/28/75 FAA

THE A MATRIX

-3.513	.6312	4.230	424.3	-668.4	-7.453	-1.772	-.4592
-1.132	-3.389	125.1	-203.9	-78.12	15.89	.3817	-.4936
3.334	4.336	-161.5	-39.27	300.1	-60.47	2.651	1.527
.7714	.1027	123.7	-513.4	131.0	-3.536	2.499	-.3176
.1438E-01	-.9503E-02	.7313E-01	1.642	-7.997	.1174	-.3013E-01	-.1093E-01
.5691	-.1080	.8171	.9481	35.63	-18.39	.6338	.4745E-01
.2215	-.2096	1.593	1.833	69.78	3.223	-18.79	.9719E-01
-.6955	.2882	27.97	-2.023	-77.91	33.76	-1.366	-20.11
-.3012E-01	-.7574E-02	.1857	.0	-3.358	.4672	-.5402E-01	6.250
-.4462E-03	-.1122E-03	.2751E-02	.0	-.4949E-01	.6947E-02	-.8163E-03	.9260E-01
-6.150	-7.098	28.81	-18.09	-689.3	94.31	-12.08	38.01
-.2761E-01	-.3255	-72.14	268.2	-.7953	.6900	.4682E-01	9.445
-.1227E-02	-.1447E-01	-3.206	11.92	-.3535E-01	.3076E-01	.2161E-02	.4198
-.1274	-.1897	-32.77	26.01	217.4	.9487	-.2017E-01	4.349
-.7474E-02	.1944E-01	-.6190E-01	.9481E-01	2.580	-.2487	19.93	.9642E-01
-2.242	1.346	2.084	161.7	192.6	-15.49	4.412	.2698
.9482	2.347	-2.837	7.316	9.431	-.3287	.3225	.3262
9.759	16.70	-2.387	1.169	10.55	1.247	2.458	1.631
-1.152	-10.28	2.941	-1.532	-13.99	-1.606	-2.917	-2.154
-1.527	3.541	4.794	.8536	7.424	.9555	1.949	1.157
.4459E-02	-.1574E-01	-.2875E-01	-.3557E-02	-.2854E-01	.4258E-01	.3075E-01	-.4888E-02
.2892E-01	.2645	.2733E-01	.3950E-01	.3440	.4540E-01	.1347	.5541E-01
.5926E-01	.5291	.5467E-01	.7899E-01	.6765	.9081E-01	.2723	.1108
-.6590E-01	-.6144	-.6038E-01	-.9173E-01	-.7797	-.1003	-.3053	-.1287
-50.00	.1067E-01	39.61	.1593E-02	.1433E-01	-.1694E-02	-.1792E-01	.2234E-02
-.6667	-.6665	.5868	.2123E-04	.1911E-03	-.2259E-04	-.2389E-03	.2979E-04
-.5796	-5.397	-48.43	-.8058	-6.966	-.9047	-2.705	-1.137
-10.11	-9.728	39.05	-49.94	.6163	.4066E-01	.8958E-01	.9608E-01
-.4493	-.4322	1.735	-1.997	-1.972	.1830E-02	.4013E-02	.4290E-02
-4.625	-4.395	17.91	-2.981	-2.672	-19.74	.6593E-01	.6435E-01
.2844E-02	.2560E-01	.1632E-01	.3822E-02	.3440E-01	.5421E-02	-19.99	.5362E-02
1.028	4.555	-1.910	.6036	5.432	27.71	25.29	-49.15

THE B MATRIX

-.2984	-57.27	-69.24	1.257	1466.
-1.722	261.7	-11.52	-40.77	.1341E+05
2.547	-292.3	46.63	-10.98	-.5224E+05
-1.191	241.0	14.81	9.059	9190.
.4830E-02	-66.05	.4032	-.6074E-01	-14.83
-.6954E-01	27.24	3.436	.3875	348.2
-.1239	69.23	7.824	.8476	806.9
.5200E-01	-49.02	-12.43	26.20	215.0
.5562E-01	-.6700	-.5412	-.7300E-01	-4986.
.8242E-03	-.9465E-02	-.8022E-02	-.1072E-02	-73.80
10.88	-448.9	-111.4	-16.66	.5963E+05
.7953E-01	17.80	-.1285	.6180	-5377.
.3519E-02	.7894	-.5521E-02	.2734E-01	-239.0
.8675E-02	37.31	.5439	1.084	-1797.
-.5820E-02	3.943	-.2647	.5025E-01	31.81
-.8480	406.2	-56.15	8.010	5532.

THE C MATRIX

.6733	-.3825	4.777	77.24	160.9	5.721	-.7341	-.1726
.3095E-01	.1651E-02	-.1262E-01	-.1462E-01	-.5636	-.2537E-01	-.9849E-02	-.7724E-03
.0	.0	.0	.0	.0	.0	.0	.0
.2016E-03	.4335E-04	-.3321E-03	-.3825E-03	-.1482E-01	-.6674E-03	-.2589E-03	-.2032E-04
.1134E-03	.4019E-03	-.4442E-02	.3325E-03	.1271E-01	-.3715E-02	.2227E-03	.1757E-04
.3804	.9899	-1.086	.1080	.9769	2.035	1.852	.1587
-.4667E-03	-.4320E-02	-.4335E-03	-.6529E-03	-.5572E-02	-.7243E-03	-.2195E-02	-.9049E-03
.0	.0	1.000	.0	.0	.0	.0	.0
-.1226E-04	-.1141E-03	-.1142E-04	-.1711E-04	-.1467E-03	-.1908E-04	-.5758E-04	-.2389E-04
.1061E-04	.9870E-04	.9891E-05	.1484E-04	.1271E-03	.1654E-04	.4983E-04	.2065E-04

THE D MATRIX

-.1576	-223.4	20.19	.3842	1186.
.1253E-02	-1.166	.7331	-.7311E-02	-6.208
.0	.0	.0	.0	.0
.3749E-04	.9215E-02	.1813E-03	-.2197E-03	-.1806
-.6068E-05	.4369E-02	.2033E-02	-.7828E-02	-.1086

BASIC POINT NO. 4

P100 MODEL-MN=0.0, ALT=0.0, PLA=67- .5PC PERTX,3PC PERTU,8/28/75 FAA

THE A MATRIX

-4.132	.6039	5.880	428.3	-726.1	-6.646	-.7558	-.3874
-1.243	-5.204	124.8	-223.7	-227.1	25.91	-.9276	-1.628
3.002	5.331	-160.5	-20.21	552.1	-68.58	2.735	3.013
.5780	-.6019E-01	121.1	-566.5	87.71	-7.600	-.5359	-2.131
.1820E-01	-.9528E-02	.2287	2.232	-7.382	.2233	.4044E-01	.1992E-01
.7680	-.8363E-01	.1685	-.6931	39.35	-18.90	.2652	-.2941E-01
.3466	-.1697	.3134	-1.553	78.53	2.222	-19.48	-.7102E-01
-.4025	.8823	22.62	1.476	-75.12	29.02	-.4810	-19.93
-.2535E-01	-.1324E-01	.1853	-.3209E-01	-4.445	.5493	-.2061E-01	6.377
-.3760E-03	-.1980E-03	.2696E-02	-.8557E-03	-.6618E-01	.8102E-02	-.3206E-03	.9448E-01
-4.506	-7.261	31.62	15.63	-841.3	99.80	-5.504	38.69
-.5226E-01	-.3814	-62.97	234.7	-9.260	1.232	-.5153E-01	9.541
-.2328E-02	-.1695E-01	-2.799	10.43	-.4119	.5479E-01	-.2336E-02	.4240
-.1569	-.2174	-28.66	21.56	188.2	1.219	-.3298E-01	4.405
-.8900E-02	.2400E-01	-.9773E-01	-.5134E-01	2.963	-.3131	19.89	.1011
-2.109	1.654	-2.013	135.8	207.9	-21.22	1.841	-.3928

1.166	3.629	-3.188	8.502	11.64	-.2480	.6694	.5527
10.20	12.78	-3.237	.4379	3.889	.4309	.6967	.6096
-.6178	-5.501	4.052	-.8206	-7.281	-.8308	-1.134	-1.142
-2.766	-5.638	4.596	-.4234	-3.862	-.3906	-.9358	-.6055
.2430E-01	.1603	-.1514E-01	.2273E-01	.2041	.6591E-01	.8521E-01	.3168E-01
-.1907E-01	-.1717	-.1304E-01	-.2552E-01	-.2140	-.2480E-01	-.4098E-02	-.3333E-01
-.4248E-01	-.3863	-.3129E-01	-.5741E-01	-.5167	-.5394E-01	-.2596E-01	-.8047E-01
.4205E-01	.3590	.3017E-01	.5335E-01	.4802	.4774E-01	.2186E-01	.7478E-01
-49.99	.3902E-01	39.52	.2900E-02	.2610E-01	-.1550E-02	-.6831E-02	.1626E-01
-.6666	-.6661	.5855	.3866E-04	.3480E-03	-.4133E-04	-.1366E-03	.2167E-03
.4335	3.794	-47.51	.5640	4.972	.5440	.1673	.7803
-9.864	-9.735	38.81	-49.99	.1305	.2790E-01	.3415E-02	.2845E-01
-.4384	-.4327	1.725	-1.999	-1.994	.1240E-02	.1366E-03	.1219E-02
-4.517	-4.358	17.84	-3.091	-2.892	-19.73	.2869E-01	.3739E-01
-.1734E-02	-.7803E-02	.1527E-01	-.2320E-02	-.2088E-01	-.1240E-02	-20.00	-.3251E-02
.6481	1.005	-2.291	.5220E-01	.5872	28.38	22.80	-49.91

THE B MATRIX

-.4711	-238.0	-106.3	3.619	2016.
-.4616	-137.0	-23.33	-77.02	6038.
1.355	408.6	56.19	13.52	-.5727E+05
.6243	206.3	.5061	-2.668	-2131.
-.2991E-01	-82.45	1.023	.1759	222.3
.2201E-01	55.74	8.338	.1616	271.5
.5017E-01	122.8	8.619	-.2908	206.3
-.1779	-75.42	-7.548	32.68	2466.
.4516E-01	1.794	-.5636	-.2229	-5634.
.6831E-03	.2378E-01	-.8480E-02	-.3354E-02	-83.55
7.200	-653.8	-90.61	-28.70	.7812E+05
.1219	-.8765	-.9822	-.1042	-6134.
.5432E-02	-.4241E-01	-.4386E-01	-.4874E-02	-273.0
.5094E-01	-21.26	.4157	.3855E-01	-2439.
.2444E-02	3.554	-.5694	.8113E-01	-32.60
-.8299E-02	351.6	-89.02	8.981	1128.

THE C MATRIX

.6649	-.5442	5.667	89.00	120.0	8.090	-.2001	-.1681
.2601E-01	.3519E-03	-.6213E-03	.3048E-02	-.1659	-.4643E-02	-.1074E-02	.1367E-03
.0	.0	.0	.0	.0	.0	.0	.0
.1234E-03	.2592E-04	-.4714E-04	.2244E-03	-.1222E-01	-.3417E-03	-.7966E-04	.1002E-04
.6857E-04	.3171E-03	-.3571E-02	-.2378E-03	.1280E-01	-.2798E-02	.8381E-04	-.1047E-04

.5140	1.614	-1.337	.1726	1.562	2.762	2.355	.2490
.8806E-04	.7925E-03	.6169E-04	.1178E-03	.9950E-03	.1085E-03	.4269E-04	.1549E-03
.0	.0	1.000	.0	.0	.0	.0	.0
.6313E-05	.5572E-04	.4538E-05	.8347E-05	.7289E-04	.7931E-05	.2635E-05	.1144E-04
-.6657E-05	-.5830E-04	-.4729E-05	-.8736E-05	-.7620E-04	-.8227E-05	-.2635E-05	-.1201E-04

THE D MATRIX

-.2484	-355.2	33.28	-.7662	2130.
-.7176E-04	-1.581	.9528	-.1128E-02	-1.128
.0	.0	.0	.0	.0
-.8166E-05	-.2304E-01	-.5410E-02	.4397E-06	-.5882E-01
.2165E-04	.1297E-01	.1330E-02	-.8858E-02	-.2342

BASIC POINT NO. 5

F100 MODEL-MN=0.0, ALT=0.0, PLA=83- .5PC PERTX,3PC PERTU,8/28/75 FAA

THE A MATRIX

-4.328	.1714	5.376	401.6	-724.6	-1.933	1.020	-.9820
-.4402	-5.643	127.5	-233.5	-434.3	26.59	2.040	-2.592
1.038	6.073	-165.0	-4.483	1049.	-82.45	-5.314	5.097
.5304	-.1086	131.3	-578.3	102.0	-9.240	-1.146	-2.408
.8476E-02	-.1563E-01	.5602E-01	1.573	-10.05	.1952	-.8804E-02	-.2110E-01
.8350	-.1249E-01	-.3567E-01	-.6074	37.65	-19.79	-.1813	-.2962E-01
.6768	-.1264E-01	-.9683E-01	-.3567	80.24	-.8239E-01	-20.47	-.3928E-01
-.9696E-01	.8666	16.87	1.051	-102.3	29.66	.5943	-19.97
-.8785E-02	-.1636E-01	.1847	.2169	-8.420	.7003	.5666E-01	6.623
-.1298E-03	-.2430E-03	.2718E-02	.3214E-02	-.1246	.1039E-01	.8395E-03	.9812E-01
-1.207	-6.717	26.26	12.49	-1269.	103.0	7.480	36.84
-.2730E-01	-.4539	-52.72	198.8	-28.09	2.243	.1794	9.750
-.1206E-02	-.2017E-01	-2.343	8.835	-1.248	.9975E-01	.8059E-02	.4333
-.1613	-.2469	-24.05	23.38	146.3	1.638	.1385	4.486
-.1244E-01	.3020E-01	-.1198	-.4821E-01	5.675	-.4525	19.81	.1249
-1.653	1.831	-3.822	113.4	341.4	-27.34	-2.040	-.6166

.9990	1.521	-4.062	9.567	10.08	-.6017	-.1312	.9602E-01
11.32	10.90	-4.071	-.5739E-01	-.6063	-.7488E-01	-.5936	-.9602E-01
-.9389E-02	.1352	5.638	.2246E-01	.1797	.2407E-01	1.100	.2743E-01
-3.081	-4.529	5.707	-.2346	-2.111	-.2460	-.4686	-.3223
.2090E-02	-.5256E-01	-.4077E-01	-.9182E-02	-.8178E-01	.3428E-01	.4995E-02	-.1256E-01
-.1953E-01	-.1622	-.6439E-02	-.2346E-01	-.2201	-.2514E-01	-.3749E-02	-.3361E-01
.1878E-01	-.2129	-.9337E-02	-.3144E-01	-.2919	-.3370E-01	.8873E-01	-.4458E-01
.2253E-01	.1791	.8371E-02	.2645E-01	.2560	.2835E-01	-.3749E-01	.3635E-01
-49.99	.6760E-01	39.46	.4991E-02	.8983E-01	.5349E-02	.0	.1372E-01
-.6666	-.6657	.5847	.6654E-04	.1347E-02	.7131E-04	.0	.2057E-03
.2854	2.332	-47.65	.3406	3.065	.3624	-.4343	.4681
-9.627	-9.557	38.48	-50.01	.1011	.1203E-01	-.4686E-01	.1715E-01
-.4278	-.4245	1.710	-2.000	-1.996	.5349E-03	-.1999E-02	.7544E-03
-4.414	-4.354	17.66	-3.113	-3.018	-19.77	-.4999E-01	.1509E-01
-.1127E-02	-.6760E-02	.1835E-01	-.9981E-03	-.1347E-01	-.1070E-02	-20.00	-.2057E-02
.5004	-.1437	-2.416	-.1073	-1.078	30.63	19.89	-50.16

```
THE B MATRIX
-.4570E-01-451.6     -105.8      -1.506      851.5
 .1114      -546.1     -6.575    -107.8      3526.
 .2153       1362.      13.46      20.14     -.6777E+05
 .3262       208.0     -2.888     -1.653     -269.1
 .9948E-02-98.39       .5069     -.1940      -94.70
 .2728E-01 71.62       9.608     -.3160      -184.1
 .1716E-01 71.71       8.571      .7989      -515.2
-.7741E-01-141.2      -.8215      39.74      1376.
 .3855E-01-7.710      -.4371E-01-.1024       -6684.
 .5707E-03-.1144      -.6359E-03-.1432E-02-99.02
 5.727      -1745.     -8.940     -17.96      .8898E+05
 .1392      -24.30     -.2736     -.3403     -6931.
 .6172E-02-1.082      -.1183E-01-.1452E-01-307.7
 .6777E-01 16.60       .3980      .2311E-01-2588.
 .1880E-02 9.147      -.8241      .8984E-01-32.31
 .1677       435.8     -89.94      4.900     -295.5

THE C MATRIX
 .4866      -.6741      5.392      95.42      24.03      10.52      .8190     -.4492
 .1383E-01 .2789E-05 .0         .0         -.1081E-01-.5545E-04 .4722E-04 .0
 .0         .0         .0         .0         .0         .0         .0         .0
 .7418E-04 .5496E-05 .4790E-05 .1478E-03-.1504E-01-.6503E-04 .8820E-04 .4999E-05
 .1538E-04 .1201E-03-.2579E-02-.1609E-03 .1618E-01-.1071E-02-.9561E-04-.5503E-05

 .5195      .8437     -1.863      .5709E-01 .4815      3.428      2.161      .7681E-01
 .0         .0         .0         .0         .0         .0         .0         .0
 .0         .0         1.000      .0         .0         .0         .0         .0
 .3434E-05 .2727E-04 .1128E-05 .4002E-05 .3673E-04 .4290E-05-.4958E-05 .5609E-05
-.3732E-05-.2996E-04-.1234E-05-.4380E-05-.4024E-04-.4721E-05 .5324E-05-.6103E-05

THE D MATRIX
-.6777E-01-420.5      32.97     -1.824      1245.
 .1282E-03 .3353      .6804     -.5605E-04-.1199E-01
 .0         .0         .0         .0         .0
 .1030E-05-.1193E-01-.5806E-02 .6015E-04 .4463E-01
 .8109E-05 .2328E-01 .1178E-03-.5538E-02-.1039
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F100 MODEL-MN=0.0, ALT=0.0, PLA=24- GROUP 1 POINTS | 10/30/75 FAA

THE A MATRIX

-1.902	1.078	-2.483	522.5	-891.2	-13.51	-2.617	-.7219
-.5426	-3.262	117.1	-229.7	-123.3	22.49	-1.254	-1.347
1.271	5.057	-130.2	11.20	287.3	-48.05	2.826	2.219
.9850E-01	.1278	99.28	-671.4	366.9	-3.652	-.6104	-.9787
.9710E-02	-.1062E-01	.1548	2.453	-15.70	.1206	.6570E-03	.2048E-02
.2979	-.2366	2.286	2.580	86.04	-16.89	.8094	.1308
.3081	-.4267	3.448	3.395	117.4	4.838	-18.88	.1793
-.4201	-.5151	44.47	-2.716	-94.50	33.59	-.8947	-20.14
-.8664E-02	-.1048E-01	.1406	-.4244	-2.242	.3396	-.2509E-01	5.909
-.1277E-03	-.1531E-03	.2186E-02	-.5659E-02	-.3363E-01	.5025E-02	-.3345E-03	.8754E-01
-3.715	-14.25	46.69	-24.62	-836.2	144.7	-7.927	40.06
.4378E-01	-.9484E-01	-132.4	448.5	9.949	-1.586	.1087	9.097
.1933E-02	-.4223E-02	-5.887	19.93	.4428	-.7056E-01	.4850E-02	.4043
.1076E-01	-.9983E-01	-59.57	45.77	244.9	.2733	-.4515E-01	4.094
-.4560E-02	.3145E-01	-.6559E-01	.6790E-01	2.747	-.2882	19.93	.7946E-01
-1.742	2.414	4.263	348.4	109.0	-22.22	3.056	.1696

.2254	-1.536	-1.873	3.382	1.049	-.3331	-1.217	-.3978
4.924	3.652	-1.985	-.2159	-1.905	-.1860	-.5417	-.2785
.3156	2.956	2.408	.4448	4.003	.3893	1.192	.5854
-1.468	-3.565	2.269	-.3585	-3.148	-.2855	-.4583	-.4490
.8094E-02	.3789E-01	-.1259E-01	.5485E-02	.4794E-01	.2889E-01	.3221E-01	.6687E-02
.7535E-01	.7304	.8406E-01	.1088	.9795	.9170E-01	.3050	.1432
.1082	1.014	.1191	.1563	1.407	.1289	.4350	.2057
-.8566E-01	-.8173	-.9408E-01	-.1227	-1.104	-.1029	-.3450	-.1614
-50.00	-.1449E-01	39.77	-.2159E-02	-.1943E-01	-.6488E-02	-.8333E-02	-.2842E-02
-.6667	-.6669	.5892	-.2879E-04	-.2591E-03	-.8651E-04	-.1111E-03	-.3789E-04
-.7777	-7.333	-48.93	-1.099	-9.873	-.9235	-3.092	-1.444
-10.15	-10.06	39.39	-49.97	.5830E-01	-.2163E-02	.2500E-01	.8525E-02
-.4513	-.4469	1.751	-1.999	-1.998	-.1730E-03	.0000E-03	.3410E-03
-4.597	-4.608	17.78	-1.961	-2.037	-19.97	.1050	-.2273E-02
.3220E-02	.2898E-01	.1280E-01	.6046E-02	.3887E-01	.6056E-02	-19.99	.5683E-02
1.003	4.159	-1.989	.5355	4.761	25.28	27.30	-49.31

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THE B MATRIX
 1.124     -18.75     -9.696      6.693     -1954.
-.3672E-01-95.98      -3.461     -48.98      2208.
-1.003      66.19      8.652      49.76     -.1195E+05
 1.010     -53.43      .1597      1.899     -1185.
-.1501E-01-26.70       .9223E-01-.9157E-01  33.63
-.3907      7.355      .1317     -1.206      763.1
-.5160      21.17      1.178     -3.331      841.1
 .7454      33.76     -3.046      9.431     -2187.
 .8762E-01-1.911      -.6416E-01-.3334      -3406.
 .1277E-02-.2880E-01-.9223E-03-.4733E-02-50.33
 23.61     -200.1     -24.63     -138.2      .3906E+05
 .1835     -1.063      .2894      2.518     -4161.
 .8268E-02-.4239E-01  .1276E-01  .1114     -185.1
 .8636E-01-6.475       .5252      1.288     -1677.
-.1578E-01-.4221      -.4938E-01  .3288      35.05
-1.476      90.18     -14.64      25.92      3470.

THE C MATRIX
 .2231     -.2993      2.427      58.58      251.0      2.882     -.2907     -.1318
 .1786E-01  .2772E-02-.2548E-01-.2769E-01-.9525      -.3434E-01-.9015E-02-.1426E-02
 .0         .0         .0         .0         .0         .0         .0         .0
 .3223E-04  .8027E-04-.6946E-03-.7572E-03-.2598E-01-.9364E-03-.2459E-03-.3905E-04
 .8807E-04  .5957E-03-.9006E-02  .5790E-03  .1982E-01-.5016E-02  .1879E-03  .2999E-04

 .9506E-01  .1623E-01-.4266      -.2336E-01-.1916      .5682      .5225     -.2126E-01
-.8795E-03-.8296E-02-.9534E-03-.1239E-02-.1115E-01-.1041E-02-.3505E-02-.1630E-02
 .0         .0         1.000      .0         .0         .0         .0         .0
-.2407E-04-.2262E-03-.2603E-04-.3393E-04-.3044E-03-.2840E-04-.9548E-04-.4451E-04
 .1836E-04  .1731E-03  .1991E-04  .2594E-04  .2326E-03  .2185E-04  .7328E-04  .3401E-04

THE D MATRIX
 .6591E-01-58.47       1.949     -3.216     -117.6
 .4080E-02-.1093       .1428      .1715E-01-7.955
 .0         .0         .0         .0         .0
 .1185E-03  .2922E-02-.2396E-02  .1784E-02  .2907
-.3918E-04  .6755E-02  .5732E-03-.8217E-02  .6138E-01
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F100 MODEL-MN=0.9, ALT=10K, PLA=83- GROUP 1 POINT 2 10/30/75 FAA

THE A MATRIX

-4.236	.6313	7.498	425.6	-722.1	-4.635	1.731	-.2338
-.5463	-8.077	127.0	-230.2	-306.0	34.58	.5953	-2.423
1.383	9.869	-161.5	-4.940	761.4	-92.70	-.9233	5.023
.2035	-.5419E-01	122.7	-617.6	39.44	-14.51	-5.194	-4.811
.7205E-02	-.2346E-01	.7351E-01	1.764	-9.116	.2219	-.5987E-02	-.1471E-01
.9160	-.6072E-01	.2040	.2517	37.67	-19.11	.1701E-01	.3096E-01
.5693	-.9553E-01	.5629	.4847	71.98	1.470	-19.97	.5181E-01
-.1442	.8236	15.46	-.4474	-76.29	28.71	-.2187E-01	-20.05
-.1335E-01	-.4398E-01	.8604E-01	-.9321E-01	-6.556	.7044	.3037E-02	6.463
-.1970E-03	-.6507E-03	.1311E-02	-.1554E-02	-.9681E-01	.1045E-01	.4050E-04	.9576E-01
-1.723	-10.82	15.99	-5.476	-909.8	107.2	-.3675	36.21
-.3289E-01	-.5179	-51.44	192.5	-18.10	2.162	.2430E-01	9.587
-.1459E-02	-.2302E-01	-2.286	8.558	-.8041	.9612E-01	.1093E-02	.4261
-.1588	-.2968	-23.28	18.39	152.0	1.727	.1118	4.438
-.7627E-02	.4565E-01	-.5654E-01	.3729E-01	3.879	-.4330	19.85	.1226
-1.177	2.920	1.690	123.9	252.8	-25.95	1.346	.3680

1.515	5.492	-3.698	10.20	15.36	-.7442E-01	1.303	.8745
11.86	12.52	-4.077	.1073	1.190	.1302	-.5430E-01	.1503
-.8448E-01	-.5745	5.747	-.8980E-01	-.8082	-.7973E-01	.6576	-.1196
-4.609	-17.56	4.689	-2.110	-18.99	-2.174	-5.019	-2.890
.7040E-02	-.1343E-01	-.4015E-01	-.3681E-02	-.2806E-01	.5971E-01	.3205E-01	-.4782E-02
.1652E-01	.1555	.1838E-01	.2295E-01	.2155	.2551E-01	.1062	.3143E-01
.2966E-01	.2771	.3321E-01	.3991E-01	.3592	.4359E-01	.1822	.5602E-01
-.2929E-01	-.2535	-.3256E-01	-.3741E-01	-.3367	-.4359E-01	-.1762	-.5124E-01
-50.00	-.5914E-01	39.52	-.3741E-02	-.3367E-01	-.2658E-02	-.2413E-01	-.1196E-01
-.6667	-.6676	.5855	-.4989E-04	-.4490E-03	-.3544E-04	-.3620E-03	-.1822E-03
-.3483	-3.380	-48.21	-.4951	-4.456	-.5408	-2.211	-.6781
-9.661	-9.589	38.58	-49.98	-.7857E-01	.2658E-02	-.1810E-01	.1196E-01
-.4294	-.4262	1.715	-1.999	-2.003	.1595E-03	-.7239E-03	.5466E-03
-4.404	-4.187	17.70	-2.970	-2.761	-19.73	.5912E-01	.5397E-01
.2253E-02	.2028E-01	.1967E-01	.2993E-02	.2694E-01	.3189E-02	-19.99	.4099E-02
1.071	5.027	-1.935	.6498	5.848	30.83	22.19	-49.12

THE B MATRIX

-.6519	-576.0	-172.1	4.493	5097.
.8367E-01	603.1	1.963	-121.0	4403.
-.2024E-01	-1150.	-10.41	47.27	-.6752E+05
2.271	1441.	-35.82	-23.67	-.1981E+05
.4431E-02	-101.8	.5331	-.2666	-87.30
-.2508E-01	18.00	22.58	2.208	1311.
-.5665E-01	3.385	38.24	2.962	1725.
.1745E-01	63.61	1.799	36.34	227.3
.5411E-01	11.96	-.1190	-.5053	-6694.
.7987E-03	.1735	-.1697E-02	-.7564E-02	-99.16
6.853	1608.	2.750	-63.92	.7168E+05
.1436	29.08	.2022	-1.041	-7062.
.6350E-02	1.277	.9326E-02	-.4607E-01	-313.5
.4368E-01	5.363	1.256	-.1674E-02	-2409.
-.4298E-02	-4.038	-.6518	.3525	88.27
-.7277	-662.2	-64.10	30.87	.1342E+05

THE C MATRIX

.1567	-1.290	7.601	118.0	-7.334	14.73	1.179	-.3184E-01
.1309E-01	.7052E-04	-.2305E-03	.0	-.4416E-01	-.1041E-02	.0	-.2764E-04
.0	.0	.0	.0	.0	.0	.0	.0
.4517E-04	.1827E-04	-.7214E-04	-.6668E-04	-.1144E-01	-.2710E-03	-.4538E-05	-.7859E-05
.2218E-04	.2614E-03	-.2355E-02	.6850E-04	.1172E-01	-.2248E-02	.4805E-05	.8121E-05

.9066	3.626	-1.978	.4474	3.973	4.400	3.615	.6078
-.1643E-04	-.1479E-03	-.1410E-04	-.2183E-04	-.1964E-03	-.2326E-04	-.1131E-03	-.2989E-04
.0	.0	1.000	.0	.0	.0	.0	.0
-.4368E-05	-.4171E-04	-.4939E-05	-.6126E-05	-.5492E-04	-.6761E-05	-.2762E-04	-.8432E-05
.4478E-05	.4311E-04	.5112E-05	.6345E-05	.5683E-04	.6988E-05	.2843E-04	.8715E-05

THE D MATRIX

-.4437	-8.493	24.98	-2.859	4216.
-.9938E-04	-.9106	.5810	-.5876E-01	-32.10
.0	.0	.0	.0	.0
.6789E-05	.1545E-02	-.5207E-02	-.4325E-03	-.2689
-.7606E-06	-.4994E-03	-.3627E-03	-.7274E-02	-.5178E-01

F100 MODEL-MN=0.3, ALT=20K, PLA=24- GROUP 1 POINT 3 10/30/75 FAA

THE A MATRIX

-1.123	.5652	2.209	457.6	-693.9	-7.207	-1.320	-.1940
-.3010	-1.650	116.8	-225.3	-82.55	12.64	-.6413	-.6466
.7156	2.322	-125.7	-1.642	183.0	-26.12	1.415	.9484
.7305E-01	.7393E-01	97.64	-526.6	221.7	-2.051	.1037	-.3179
.3921E-02	-.5295E-02	.3779E-02	1.491	-13.45	.4766E-01	-.1584E-01	-.7005E-02
.3639	-.2459	1.272	-1.708	87.40	-17.06	.6828	-.2586E-01
.3112	-.3984	2.174	-1.642	119.6	5.208	-19.07	-.1724E-01
-.4587	-.2819	75.69	1.314	-108.8	33.74	-.8393	-19.98
-.6601E-02	.1835E-02	-.5743	-.1642	-2.886	.2471	-.2829E-01	5.997
-.9975E-04	.2447E-04	-.8836E-02	-.4380E-02	-.4233E-01	.3605E-02	-.4401E-03	.8884E-01
-3.787	-11.72	83.15	11.33	-968.4	140.6	-7.478	41.68
.5501E-01	-.1083	-227.6	785.7	12.70	-1.855	.8016E-01	9.182
.2447E-02	-.4813E-02	-10.12	34.92	.5657	-.8260E-01	.3584E-02	.4080
-.1144E-01	-.1065	-102.0	94.67	449.2	-.1156	-.1320E-01	4.133
-.5105E-02	.2265E-01	-.1590	.2628	2.540	-.2610	19.92	.7652E-01
-1.632	1.668	1.325	459.2	128.4	-18.93	2.391	-.4769
.2571	.3856	-.9037	2.185	2.350	-.1375	-.8459E-01	.2602E-01
2.996	3.021	-1.080	.4835E-02	.4351E-01	.0	-.3760E-01	.6505E-02
-.1428E-01	-.1285	1.150	-.2417E-01	-.2176	-.1473E-01	.6580E-01	-.2602E-01
-.6891	-.6748	1.400	.0	.0	.7365E-01	.2820E-01	.0
-.8470E-03	-.2560E-01	-.1146E-01	-.4417E-02	-.3956E-01	.8443E-02	.5541E-02	-.5794E-02
-.1714E-01	-.1542	-.1049E-01	-.2321E-01	-.2089	-.1375E-01	.3572E-01	-.3122E-01
-.1143E-01	-.1028	-.1295E-01	-.1740E-01	-.1566	-.1571E-01	.3572E-01	-.2082E-01
.1214E-01	.1093	.9253E-02	.1644E-01	.1479	.1277E-01	-.3948E-01	.2212E-01
-50.00	.3213E-01	39.72	.4835E-02	.4351E-01	-.2455E-02	-.1410E-01	.6505E-02
-.6666	-.6662	.5885	.6446E-04	.5802E-03	-.3273E-04	-.2506E-03	.8673E-04
.1071	.9319	-47.98	.1450	1.305	.9820E-01	-.3102	.1886
-10.41	-10.32	39.30	-49.97	.2393	.1719E-01	.4700E-02	.0
-.4627	-.4589	1.747	-1.999	-1.990	.6874E-03	.1880E-03	.0
-4.683	-4.653	17.70	-2.172	-2.062	-19.87	.1880E-01	.2602E-02
.2856E-02	.2571E-01	.1295E-01	.3868E-02	.3481E-01	.3928E-02	-20.00	.5204E-02
.5659	.2571	-2.333	-.5560E-01	-.5004	23.83	27.03	-50.07

THE B MATRIX

-.6024E-01	8.327	-4.147	3.774	-3.758
-.6773	-48.51	-1.580	-20.76	1953.
.4405	23.16	4.104	16.11	-7988.
.3715E-01	.8543	.4572	1.111	218.9
.2263E-01	-14.56	.2289E-01	-.5742E-01	-16.82
.7895E-02	-1.506	-.4857	-1.718	-19.88
.1165	-11.97	.8537	-2.728	91.95
.5516	42.63	-2.848	12.02	-776.7
.1255	-1.454	-.5831E-01	-.1722	-3140.
.1930E-02	-.1874E-01	-.8836E-03	-.2829E-02	-46.67
36.48	-147.2	-21.37	-80.19	.4464E+05
.2846	-2.176	.3194	1.576	-4031.
.1283E-01	-.9751E-01	.1409E-01	.6986E-01	-179.2
.1194	-.6207	.2886	.4512	-1698.
-.4270E-02	.7839	-.5052E-01	.6150E-01	-50.32
.4198	27.39	-12.79	12.07	-138.2

THE C MATRIX

.4168E-01	-.1717	2.854	55.38	257.9	2.030	-.1659	-.6563E-01
.1128E-01	.1986E-02	-.1049E-01	.8828E-02	-.7216	-.2397E-01	-.5564E-02	.1212E-03
.0	.0	.0	.0	.0	.0	.0	.0
.9079E-04	.1123E-03	-.5881E-03	.4868E-03	-.4033E-01	-.1354E-02	-.3108E-03	.6762E-05
.9147E-04	.3515E-03	-.1561E-01	-.2887E-03	.2321E-01	-.4906E-02	.1789E-03	-.3868E-05
.7537E-01	.7969E-01	-.2680	.8171E-02	.6875E-01	.3945	.4483	.6115E-02
.7587E-04	.7230E-03	.6169E-04	.1088E-03	.9790E-03	.7672E-04	-.2291E-03	.1382E-03
.0	.0	1.000	.0	.0	.0	.0	.0
.4481E-05	.4032E-04	.3524E-05	.6173E-05	.5556E-04	.4364E-05	-.1262E-04	.8163E-05
-.2606E-05	-.2307E-04	-.2101E-05	-.3624E-05	-.3261E-04	-.2445E-05	.7366E-05	-.4621E-05

THE D MATRIX

-.2620E-01	-44.62	.4012	-1.322	60.79
-.8102E-04	.4178E-01	.8156E-01	.1339E-01	-.2272
.0	.0	.0	.0	.0
.6072E-04	.4127E-02	-.3756E-02	.7574E-03	-.1401E-01
.1753E-03	.1456E-01	.3809E-03	-.1186E-01	-.3047

F100 MODEL-MN=0.6, ALT=10K, PLA=20- GROUP 1 POINT 4   10/31/75 FAA

THE A MATRIX

-1.777	1.516	-3.020	542.6	-769.4	-15.09	-2.349	-.4741E-01
-.4943	-2.597	136.4	-241.2	-66.37	17.20	-.8854	-.6584
1.053	3.681	-144.9	4.218	142.1	-35.12	1.920	.9007
.1281	.9784E-01	102.2	-620.3	359.0	-1.640	.2016	-.3266
.4768E-02	-.9773E-02	-.2083E-02	1.661	-15.56	.6841E-01	-.2400E-01	-.1171E-01
.3345	-.2026	1.118	-1.740	27.28	-17.99	.3875	-.3055E-01
.4264	-.7346	4.047	-4.851	80.78	7.122	-18.90	-.9903E-01
-.4753	-.4955	63.41	3.744	-65.00	34.52	-.8889	-19.92
-.5384E-02	-.1322E-02	-.1133	.9227	-.2024	.2577	.8767E-02	5.728
-.7897E-04	-.1763E-04	-.1510E-02	.1406E-01	-.2698E-02	.3836E-02	.1169E-03	.8487E-01
-4.454	-14.79	129.0	33.61	-610.3	149.8	-8.346	42.97
.1098	.4120	-215.8	692.4	16.19	-3.337	.2148	8.886
.4889E-02	.1832E-01	-9.593	30.78	.7204	-.1482	.9643E-02	.3949
.2864E-01	.7774E-01	-95.97	89.11	336.4	-.3676	.2630E-01	3.999
-.3661E-02	.2200E-01	-.2567	.0	.9713	-.2113	19.96	.5583E-01
-1.479	1.916	-5.286	426.8	-123.6	-18.31	1.714	-.5768

.4038	1.408	-.8987	2.566	3.929	-.1435E-01	.6123E-01	.2253
3.790	4.354	-1.182	.9217E-01	.8295	.9089E-01	.9621E-01	.1223
-.1382	-1.244	1.264	-.1892	-1.703	-.1818	-.1837	-.2511
-.8003	-.4256	1.630	.6306E-01	.5676	.1626	.1487	.7725E-01
-.3287E-02	-.5194E-01	-.1596E-01	-.8488E-02	-.7639E-01	.6847E-02	.5625E-02	-.1128E-01
-.2401E-01	-.2161	-.2081E-01	-.3202E-01	-.2882	-.2583E-01	-.1399E-01	-.3734E-01
-.6475E-01	-.6155	-.5928E-01	-.9120E-01	-.8208	-.8706E-01	-.6822E-01	-.1210
.5238E-01	.4714	.4604E-01	.7083E-01	.6374	.6793E-01	.5598E-01	.9399E-01
-49.99	.1146	39.90	.1698E-01	.1528	.1674E-01	.2187E-01	.2253E-01
-.6666	-.6649	.5911	.2587E-03	.2329E-02	.2551E-03	.3499E-03	.3434E-03
.4729	4.289	-47.80	.6500	5.850	.6123	.5204	.8562
-10.94	-10.89	39.43	-49.98	.1746	.1914E-01	.2624E-01	.1609E-01
-.4861	-.4832	1.753	-1.999	-1.992	.8611E-03	.1225E-02	.7725E-03
-4.902	-4.819	17.71	-1.664	-1.546	-19.89	.5773E-01	.1674E-01
.0	.0	.6937E-02	.0	.0	-.9568E-03	-20.00	.0
.4984	-.4420	-2.288	-.1504	-1.353	21.02	29.35	-50.20

THE B MATRIX

-.7631	3.121	-8.297	18.33	771.2
-.8525	-26.06	-2.699	-57.77	1869.
1.161	7.063	6.004	44.61	-9384.
-.7385E-01	24.51	.9863	2.235	624.8
.3518E-01	-19.72	.2271E-01	-.1497	-35.86
.0000E-01	-4.044	-.3962	-2.464	-99.32
.3526	-7.527	2.422	-9.041	-331.3
-.1024	16.91	-2.838	26.38	-157.1
.3535E-01	.6079	-.1592E-01	-.3436	-2741.
.4929E-03	.8280E-02	-.2350E-03	-.4921E-02	-40.57
28.81	-102.2	-25.29	-166.4	.4187E+05
.1996	-1.168	.6547	13.64	-3438.
.8731E-02	-.5591E-01	.2917E-01	.6069	-152.5
.1072	2.256	.5280	5.319	-1420.
.1767E-01	1.228	-.1937E-01	.1921	-33.52
.6626	-10.12	-11.56	22.69	-393.4

THE C MATRIX

-.1298	-.2878	4.026	59.29	286.2	2.815	-.1468	-.5894E-01
.1588E-01	.2135E-02	-.1123E-01	.1664E-01	-.2975	-.2283E-01	-.4060E-02	.3457E-03
.0	.0	.0	.0	.0	.0	.0	.0
-.3491E-04	.1273E-03	-.6683E-03	.9970E-03	-.1774E-01	-.1235E-02	-.2421E-03	.2064E-04
.1819E-03	.1464E-02	-.2340E-01	-.1382E-02	.2493E-01	-.1332E-01	.3412E-03	-.2893E-04

.9032E-01	.1211	-.2830	.1640E-01	.1476	.4267	.5994	.2150E-01
.2364E-03	.2128E-02	.2050E-03	.3153E-03	.2838E-02	.2990E-03	.2624E-03	.4185E-03
.0	.0	1.000	.0	.0	.0	.0	.0
.1406E-04	.1274E-03	.1227E-04	.1888E-04	.1699E-03	.1796E-04	.1561E-04	.2523E-04
-.1953E-04	-.1768E-03	-.1724E-04	-.2656E-04	-.2391E-03	-.2512E-04	-.2195E-04	-.3530E-04

THE D MATRIX

-.6433E-01	-38.00	-.8135	-3.851	31.58
-.1549E-02	.4642E-01	.1140	.2372E-01	.7284
.0	.0	.0	.0	.0
-.5216E-04	.1677E-02	-.3251E-02	.1464E-02	.5692E-01
.3977E-03	.2681E-01	.9089E-03	-.4320E-02	-.7169

F100 MODEL-MN=0.6, ALT=30K, PLA=24- GROUP 1 POINT 5 10/31/75 PAA

THE A MATRIX

-1.216	.4280	7.895	457.1	-624.4	-3.992	-.7985	.4683E-01
-.2750	-1.624	103.8	-234.0	-75.12	9.883	-.7421	-.6244
.7734	2.008	-124.0	.3524	209.1	-21.25	2.039	.9314
.3222E-01	-.1481E-01	87.67	-571.3	96.38	-2.973	-1.146	-1.056
.5795E-02	-.3761E-02	.1213	1.903	-8.405	.4969E-01	-.4079E-02	.8697E-03
.5009	-.1449	.7895	.0	61.52	-18.40	.6125	.0
.3452	-.4024	1.854	-.5639	143.6	4.452	-18.62	-.8326E-02
-.6217	.8898E-01	101.8	1.198	-166.4	32.68	-1.601	-19.99
-.9368E-02	.0	-.7344	.0	-1.772	.2455	-.2349E-01	6.088
-.1399E-03	-.3405E-05	-.1102E-01	-.2349E-02	-.2835E-01	.3582E-02	-.3758E-03	.9019E-01
-4.456	-11.04	68.71	6.696	-1195.	124.9	-11.52	41.19
.5058E-01	-.1632	-245.6	878.8	11.69	-1.320	.1033	9.275
.2248E-02	-.7253E-02	-10.92	39.05	.5244	-.5854E-01	.4697E-02	.4123
-.1874E-01	-.1508	-110.2	106.1	574.9	.3872	-.3006E-01	4.234
-.7194E-02	.2053E-01	-.1102	.0	3.685	-.2242	19.96	.6973E-01
-1.947	1.520	15.88	526.2	254.4	-14.45	4.387	.2264

.4038	1.741	-.7671	2.356	4.199	.6275E-01	.3370	.3169
2.793	2.688	-1.019	-.1386E-01	-.1247	-.1448E-01	-.8425E-01	-.1940E-01
.6787E-02	.6108E-01	1.089	.4620E-02	.4157E-01	.1448E-01	.1685	.1293E-01
-1.093	-4.856	.8901	-.6421	-5.779	-.6131	-1.283	-.8990
.3923E-02	.1861E-01	-.6293E-02	.2498E-02	.2276E-01	.1492E-01	.1888E-01	.3506E-02
.6787E-03	.0	.5856E-03	.9239E-03	.0	-.1931E-02	.5242E-01	.1293E-02
-.8144E-02	-.4887E-01	-.3514E-02	-.1109E-01	-.6652E-01	-.7723E-02	.8425E-01	-.1552E-01
.8823E-02	.8551E-01	.7613E-02	.1201E-01	.1164	.7723E-02	-.9549E-01	.1682E-01
-50.00	.0	39.68	.0	.0	.0	.0	.0
-.6667	-.6669	.5878	-.3080E-04	-.2772E-03	-.3218E-04	-.6241E-04	-.4312E-04
.5599E-01	.5039	-47.95	.7853E-01	.7483	.4827E-01	-.7162	.1067
-10.57	-10.49	39.32	-50.00	-.2079E-01	-.7241E-02	.4681E-02	-.9701E-02
-.4699	-.4661	1.748	-2.000	-2.001	-.2896E-03	.3745E-03	-.3880E-03
-4.767	-4.563	17.82	-2.641	-2.411	-19.79	.8800E-01	.3751E-01
.0	.0	.9955E-02	.0	.0	.0	-20.00	.0
.9909	4.260	-1.878	.5659	4.989	23.98	28.86	-49.22

THE B MATRIX

-1.337	24.16	-6.297	5.356	1442.
.1123	5.530	-2.301	-25.41	694.4
-.5150E-01	-8.447	6.241	19.46	-7051.
3.624	-107.2	-1.792	-2.437	-3273.
-.1379E-01	-13.48	.5725E-01	-.2766E-01	16.44
-.2522E-01	7.340	-.4989	-1.430	-22.87
.1286	12.71	2.738	-4.079	-93.22
-.4173E-01	-1.005	-4.855	16.36	83.93
.1499	1.067	-.9447E-01	-.2701	-3345.
.2340E-02	.1083E-01	-.1486E-02	-.3981E-02	-49.63
40.83	18.52	-35.29	-109.8	.4296E+05
.3555	-8.324	.3860	1.375	-4309.
.1560E-01	-.3609	.1727E-01	.6124E-01	-191.4
.2857E-01	.5678	.5855	.4551E-01	-1731.
-.1522E-02	.6575	-.6084E-01	.2243	8.947
-3.168	131.3	-14.80	18.09	3638.

THE C MATRIX

.1381E-01	-.1943	5.068	80.78	211.6	2.458	-.9573E-01	.1613E-01
.1267E-01	.1578E-02	-.7172E-02	.3524E-02	-.6688	-.1795E-01	-.6441E-02	.5203E-04
.0	.0	.0	.0	.0	.0	.0	.0
.8356E-04	.9271E-04	-.4267E-03	.2237E-03	-.3936E-01	-.1035E-02	-.3794E-03	.3303E-05
.1093E-03	.3451E-03	-.1722E-01	-.1686E-03	.2931E-01	-.3073E-02	.2825E-03	-.2363E-05

.1536	.6814	-.2795	.9198E-01	.8165	.6038	.7738	.1269
.3181E-04	.3054E-03	.2928E-04	.4331E-04	.4157E-03	.2414E-04	-.4037E-03	.5659E-04
.0	.0	1.000	.0	.0	.0	.0	.0
.1930E-05	.1842E-04	.1716E-05	.2628E-05	.2507E-04	.1450E-05	-.2363E-04	.3474E-05
-.1375E-05	-.1312E-04	-.1222E-05	-.1929E-05	-.1857E-04	-.1049E-05	.1780E-04	-.2590E-05

THE D MATRIX

-.4939	-37.42	.4392	-1.534	529.7
-.4459E-03	-.9282E-01	.1066	.1589E-01	.5320
.0	.0	.0	.0	.0
-.1716E-04	-.3584E-02	-.2774E-02	.9190E-03	.2173E-01
.1922E-04	.1394E-02	.8475E-03	-.1046E-01	-.1593E-01

F100 MODEL-MN=1.2, ALT= OK, PLA=83- GROUP 2 POINT 6   12/01/75 JHK

THE A MATRIX

-7.086	2.013	1.608	400.2	-555.3	-20.21	-3.401	-1.149
-2.720	-8.112	117.2	-227.5	-58.70	24.87	-2.813	-3.241
8.268	8.377	-165.9	-8.815	193.7	-82.73	9.808	6.454
1.359	-.3418	132.7	-574.5	18.57	-7.858	.6704	-3.181
.7162E-02	-.2163E-01	.2871E-01	1.556	-9.460	.1538	-.7906E-01	-.3998E-01
.6835	-.1451	.3571	.1233E-01	6.557	-18.43	.3484	.1785E-02
.5362	-.3483	.8742	.6781E-01	14.43	3.738	-19.20	.8332E-02
-.7108	.8525	13.56	-.4315E-01	-18.34	26.06	-.9704	-20.01
-.3873E-01	-.7358E-02	.7272E-01	-.7705E-01	-1.146	.3599	-.5770E-01	6.039
-.5720E-03	-.1079E-03	.1131E-02	-.1027E-02	-.1681E-01	.5344E-02	-.8425E-03	.8949E-01
-6.016	-5.464	13.06	-.4315	-155.8	58.50	-8.256	38.10
-.7815E-01	-.3637	-34.73	128.4	-1.681	.8452	-.8792E-01	9.067
-.3469E-02	-.1616E-01	-1.543	5.706	-.7490E-01	.3752E-01	-.3846E-02	.4030
-.1728	-.2173	-15.71	15.45	103.8	.9783	-.8682E-01	4.154
.2783E-02	.1494E-01	-.3232E-01	.0	.4586	-.1549	19.91	.8808E-01
-.8694	1.038	.4040E-01	70.07	34.05	-10.34	1.893	-.2708

1.761	3.406	-5.972	15.30	17.43	-.9489	.1313	.3565
18.12	20.55	-6.033	.4631	3.876	.4436	.6837	.5683
-.5226	-4.670	8.344	-.6896	-6.206	-.6801	-.7384	-.9777
-4.805	-6.087	9.234	-.1693	-1.501	-.1640	-.3008	-.2188
-.1508E-02	-.1309	-.7268E-01	-.2142E-01	-.1895	.8016E-01	.4307E-01	-.3099E-01
.7493E-03	.6744E-02	.9694E-03	.1494E-02	.1344E-01	.4301E-02	.2844E-01	.2118E-02
.5245E-02	.4721E-01	.6786E-02	.6971E-02	.6274E-01	.1344E-01	.9189E-01	.9883E-02
-.3746E-02	-.3372E-01	-.4524E-02	-.6971E-02	-.4481E-01	-.9678E-02	-.7657E-01	-.7059E-02
-50.00	.8430E-02	39.74	-.3734E-02	-.3361E-01	-.2688E-02	-.1641E-01	-.5295E-02
-.6666	-.6664	.5888	-.4979E-04	-.4481E-03	-.3584E-04	-.2188E-03	-.7059E-04
-.3372E-01	-.3204	-48.05	-.4730E-01	-.4817	-.1035	-.6646	-.6706E-01
-9.778	-9.594	38.93	-49.99	.1456	.8065E-02	.1094E-01	.4412E-01
-.4346	-.4262	1.730	-2.000	-1.994	.3764E-03	.4376E-03	.1977E-02
-4.468	-4.326	17.81	-3.235	-3.128	-19.73	.3938E-01	.3318E-01
.0	.0	.1325E-01	.0	.0	.0	-20.00	.0
.6538	1.442	-2.145	.1344	1.210	26.69	24.21	-49.82

THE B MATRIX

-.3316	-486.8	-235.7	47.14	3512.
-.2458	-141.2	-84.82	-67.76	.1218E+05
.5924	359.5	261.7	162.1	-.1076E+06
.1620	42.58	22.15	13.72	3863.
.1476E-01	-140.3	.7506	-.7647	-248.8
.1899E-01	80.14	5.542	-3.282	-33.10
.2327E-02	20.60	17.94	-7.752	3.841
-.8008E-02	-32.57	-22.96	-10.43	-195.8
.3050E-01	-2.252	-1.348	-.8336	-6007.
.4455E-03	-.3453E-01	-.1978E-01	-.1225E-01	-88.82
4.044	-332.4	-197.1	-126.0	.7138E+05
.8116E-01	-2.634	-2.320	-1.458	-6501.
.3604E-02	-.1205	-.1029	-.6485E-01	-288.9
.4398E-01	-17.33	-.5991	-1.789	-2558.
-.4184E-03	.3066	-.1980	.3212	15.53
-.9233E-01	5.549	-66.09	24.21	2626.

THE C MATRIX

-.7231	-1.074	6.678	110.0	123.7	12.67	-1.148	-.5475
.3411E-01	.6364E-03	-.1535E-02	.0	-.2828E-01	-.6762E-02	-.1484E-02	.0
.0	.0	.0	.0	.0	.0	.0	.0
.4626E-04	.3914E-04	-.9634E-04	-.5267E-05	-.1782E-02	-.4228E-03	-.9423E-04	-.6829E-06
.8816E-04	.2876E-03	-.1674E-02	.6998E-05	.2260E-02	-.1601E-02	.1196E-03	.9299E-06
1.070	2.668	-3.261	.2561	2.248	6.326	5.894	.3660
.0	.0	.0	.0	.0	.0	-.1094E-03	.0
.0	.0	1.000	.0	.0	.0	.0	.0
-.4070E-06	-.3664E-05	-.5049E-06	-.5713E-06	-.5142E-05	-.1089E-05	-.7625E-05	-.8100E-06
.5579E-06	.4981E-05	.6311E-06	.8023E-06	.6619E-05	.1464E-05	.9721E-05	.1043E-05

THE D MATRIX

-.1618	-334.0	-3.267	-22.03	3286.
.4526E-03	1.625	1.851	.1340E-01	11.03
.0	.0	.0	.0	.0
.6408E-06	.1309E-02	-.5808E-02	.8868E-03	.1148E-01
-.3639E-05	.8088E-02	.3202E-02	.4514E-04	.1964

F100 MODEL-MN=2.2, ALT=40K, PLA= 83- GROUP 2 POINT 7 12/04/75 JHK

THE A MATRIX

-4.357	.5286	2.697	432.3	-674.6	-5.806	-2.562	-.6882
-1.491	-3.345	108.2	-234.7	-80.40	6.112	-1.780	-1.999
5.066	3.687	-161.2	3.293	274.7	-37.20	6.030	3.842
.7951	-.2896	134.3	-599.8	75.50	-3.319	.4322	-1.664
.9978E-02	-.1261E-01	-.1333	1.085	-10.99	.6884E-02	-.1013	-.5110E-01
.5876	-.7043E-01	.3557	.2839	18.97	-19.19	.4209	.0
.4413	-.1728	.9011	.6927	43.01	2.042	-19.06	.8639E-02
-.8768	.6111	27.78	-.6813	-47.86	27.15	-1.057	-20.00
-.3770E-01	.3699E-02	.1779	-.1136	-2.076	.2957	-.4374E-01	5.854
-.5596E-03	.5425E-04	.2668E-02	-.1514E-02	-.3104E-01	.4384E-02	-.6517E-03	.8674E-01
-6.382	-4.067	19.54	-4.883	-348.1	47.16	-7.690	38.70
-.5705E-01	-.3512	-64.27	235.5	-3.460	.5021	-.5660E-01	8.820
-.2543E-02	-.1561E-01	-2.856	10.47	-.1560	.2233E-01	-.2573E-02	.3920
-.1987	-.1854	-29.08	19.40	192.7	.5373	-.8541E-01	4.011
-.3217E-02	.9247E-02	-.4446E-01	.0	1.057	-.1060	19.92	.8063E-01
-1.872	.6388	.8004	132.9	83.93	-7.043	2.081	-.3974
.7757	.9926	-3.046	7.690	7.873	-.8183	.1281	.1372E-01
9.670	9.707	-3.426	.7435E-02	.6691E-01	-.2345E-01	-.1230	.1029E-01
.7477E-02	-.6729E-01	4.750	-.1487E-01	-.8921E-01	.9121E-01	.4408	-.1029E-01
-2.548	-3.079	4.956	-.4213E-01	-.3569	.4430E-01	-.8200E-01	-.5489E-01
-.1984E-01	-.2440	-.5634E-01	-.3701E-01	-.3347	.1542E-01	-.2495E-01	-.5160E-01
.2617E-02	.6729E-02	-.3232E-02	.9913E-03	.8921E-02	.8860E-02	.3383E-01	.2745E-02
.8225E-02	.4711E-01	-.3878E-02	.7930E-02	.6245E-01	.2398E-01	.8508E-01	.1166E-01
-.5608E-02	-.1346E-01	.8403E-02	-.1983E-02	-.1784E-01	-.2189E-01	-.8713E-01	-.2745E-02
-49.99	.5888E-01	39.85	.6195E-02	.7806E-01	-.2606E-02	.0	.8577E-02
-.6666	-.6658	.5904	.9913E-04	.1190E-02	-.3475E-04	.0	.1372E-03
-.3458E-01	-.1514	-48.06	-.1611E-01	-.2007	-.1511	-.6202	-.3088E-01
-9.741	-9.623	39.06	-49.99	.1227	-.1303E-02	.7688E-02	.1201E-01
-.4329	-.4280	1.736	-2.000	-1.995	-.5212E-04	.3075E-03	.4803E-03
-4.430	-4.391	17.76	-2.800	-2.783	-19.72	-.1066	.6175E-02
.0	.0	.1164E-01	.4956E-03	.0	.0	-20.00	.0
.5654	.6729	-2.221	.9913E-02	.8921E-01	25.54	24.94	-49.99

THE B MATRIX

-.5490E-01	-252.5	-93.80	112.4	1112.
.5930E-01	-134.4	-25.28	-461.5	4756.
-.1354E-01	252.4	85.05	713.0	-.5543E+05
.9604E-01	27.09	6.717	60.42	2891.
.4316E-01	-96.64	.1996	-3.497	-448.2
-.7963E-02	.9667	3.978	-15.62	-14.81
.8385E-02	40.54	13.43	-38.83	87.01
.1638E-01	-19.69	-14.56	-1.921	-157.7
.4716E-01	-1.427	-.6188	-5.403	-5642.
.6957E-03	-.2144E-01	-.9185E-02	-.7990E-01	-83.54
7.574	-335.3	-106.3	-900.6	.6873E+05
.1630	-9.786	-.9116	-8.494	-6394.
.7274E-02	-.4388	-.4083E-01	-.3777	-284.6
.1001	47.19	-1.052	-9.650	-2726.
-.1843E-03	1.366	-.2007	2.034	2.722
.3634E-02	146.3	-52.40	136.3	1870.

THE C MATRIX

-.8456	-.6295	4.665	129.5	9.744	6.174	-1.914	-.9510
.3033E-01	.1212E-02	-.6105E-02	-.4578E-02	-.3390	-.1456E-01	-.7232E-02	.0
.0	.0	.0	.0	.0	.0	.0	.0
.1471E-04	.2120E-04	-.1068E-03	-.7763E-04	-.5760E-02	-.2473E-03	-.1262E-03	-.4218E-07
.1025E-03	.2710E-03	-.3232E-02	.7679E-04	.5595E-02	-.1716E-02	.1233E-03	.6327E-07
.3203	-1.674	-2.509	-.3418	-3.080	3.560	3.054	-.4759
-.3388E-04	-.1472E-03	.5757E-04	-.2168E-04	-.1952E-03	-.1401E-03	-.5958E-03	-.3002E-04
.0	.0	1.000	.0	.0	.0	.0	.0
-.5202E-06	-.1232E-05	.1057E-05	-.1815E-06	-.1634E-05	-.2348E-05	-.9848E-05	-.3937E-06
.4746E-06	.1314E-05	-.1026E-05	.1513E-06	.1742E-05	.2271E-05	.9698E-05	.3183E-06

THE D MATRIX

.4252	216.5	-12.96	-149.2	-3838.
-.1945E-03	-.2257	.7381	.2736	-.4829
.0	.0	.0	.0	.0
.1337E-06	-.3631E-02	-.2065E-02	.4735E-02	.2209E-02
-.1702E-05	.5823E-02	.1704E-02	.1585E-01	.3185E-01

F100 MODEL-MN=0.9, ALT=45K, PLA=130- GROUP 2 POINT 8 12/04/75 JHK

THE A MATRIX

-1.298	.8600E-01	1.169	387.2	-738.3	-2.212	-.3481E-01	-.4497
-.1446	-1.551	129.0	-253.2	-421.0	7.465	.7728	-.7755
.3428	1.630	-157.2	29.84	1001.	-23.13	-1.873	1.569
.2337	.4713E-01	136.8	-529.7	179.0	-1.538	.7937	-.8144E-01
.3172E-02	-.4783E-02	.7127E-01	1.363	-10.54	.7028E-01	.3205E-02	-.4393E-02
.8278	-.1194E-01	.9158	6.701	142.5	-19.70	-.2117	.2337E-01
.7413	.2254E-01	.8282	10.88	431.5	.5502	-20.49	.1346E-01
-.1207	.8655	56.59	-10.25	-354.9	30.11	.6781	-20.03
-.1026E-01	-.1512E-01	.3166	-1.282	-28.68	.6771	.5918E-01	6.967
-.1535E-03	-.2225E-03	.4547E-02	-.1831E-01	-.4256	.1002E-01	.8819E-03	.1032
-1.610	-6.996	72.73	-138.0	-4713.	110.2	9.009	35.34
-.3578E-01	-.4969	-191.1	715.1	-102.2	2.457	.2089	10.22
-.1591E-02	-.2209E-01	-8.492	31.78	-4.543	.1092	.9190E-02	.4542
-.1320	-.3328	-86.79	79.83	446.7	2.618	.1476	4.619
-.1291E-01	.3417E-01	-.2923	.7323	22.85	-.5147	19.79	.1431
-2.598	3.736	-40.80	-341.5	3626.	-53.83	-2.374	2.406

.1494	-.6815	-1.105	2.669	1.451	-.1608	-.3245	-.3507
3.098	2.798	-1.096	-.4756E-01	-.4280	.5079E-01	-.1795	-.1740
.1116	.7532	1.433	.1030	.9512	-.1298	.4004	.4065
-.4762	1.883	1.833	.3963	3.472	.3922	1.063	.2420
.1017E-02	-.7540E-02	-.9063E-02	-.1415E-02	-.1151E-01	-.7499E-03	-.3882E-02	.9019E-02
.2630E-01	.1686	-.1498E-01	.2272E-01	.2045	-.2935E-01	.9389E-01	.4975E-01
.4025E-01	.2582	-.2315E-01	.3488E-01	.3139	-.6546E-01	.1450	.2422
-.3666E-01	-.2331	.2213E-01	-.3224E-01	-.2901	.4966E-01	-.1270	-.1430
-50.00	-.8967E-02	39.26	-.3963E-02	-.2378E-01	.1411E-02	-.2071E-01	-.1291E-01
-.6667	-.6668	.5816	-.5284E-04	-.3171E-03	.1881E-04	-.3222E-03	-.1903E-03
-.4891	-3.192	-47.29	-.4399	-4.055	.6574	-1.785	-1.900
-9.412	-9.406	38.24	-50.01	-.7134E-01	.1552E-01	-.4833E-01	-.3602E-01
-.4183	-.4182	1.700	-2.000	-2.003	.6772E-03	-.2209E-02	-.1604E-02
-4.335	-4.537	17.46	-3.289	-3.453	-19.92	-.2140	.1446
.3586E-02	.1435E-01	.2076E-01	.2114E-02	.1902E-01	-.2822E-02	-19.99	.9516E-02
.3885E-01	6.806	3.071	.9578	9.702	22.30	14.43	-48.19

THE B MATRIX

.5408	23.54	-34.63	-1.043	-2099.
.2440	-8.790	-2.544	-17.07	328.0
-.2194	15.77	5.937	14.54	-.1585E+05
-1.542	-70.00	7.029	6.119	5191.
.5759E-02	-15.49	.1719	-.6020E-01	-17.39
-.9816E-01	-19.83	10.46	.2000	542.7
-.3211	-12.66	13.34	.8751	1047.
-.1801E-01	-2.816	-2.053	10.98	428.6
.1960	2.701	-.2224	-.4966	-7028.
.2900E-02	.3777E-01	-.3305E-02	-.7409E-02	-104.2
25.08	-22.15	-26.76	-67.84	.7594E+05
.5287	7.633	-.5694	-1.457	-7365.
.2356E-01	.3498	-.2558E-01	-.6481E-01	-327.5
.5047	17.33	1.914	-1.874	-3301.
-.1516E-01	.9643	-.7587	.3818	58.40
-5.608	-259.5	-132.9	40.78	.1022E+05

THE C MATRIX

.2201	-.4951	7.467	141.7	-152.8	7.279	.3331	-.4459
.4063E-02	.1716E-05	-.1218E-03	-.8010E-03	-.1850E-01	-.3102E-04	.3046E-04	-.8853E-05
.0	.0	.0	.0	.0	.0	.0	.0
.1190E-03	.6665E-05	-.2438E-03	-.1829E-02	-.6219E-01	-.1388E-03	.1182E-03	-.5334E-05
.2258E-04	.1347E-03	-.1001E-01	.1942E-02	.6600E-01	-.1272E-02	-.1257E-03	.5576E-05

.1023	-.7489	-.9335	-.1429	-1.294	-.6817E-01	-.4220	.9348
-.4981E-05	-.4484E-04	.0	-.6606E-05	-.5945E-04	.0	-.1726E-04	-.5947E-05
.0	.0	1.000	.0	.0	.0	.0	.0
-.6591E-05	-.4374E-04	.3852E-05	-.6025E-05	-.5423E-04	.8515E-05	-.2370E-04	-.2497E-04
.6883E-05	.4571E-04	-.4114E-05	.6277E-05	.5649E-04	-.9314E-05	.2483E-04	.2663E-04

THE D MATRIX

.5767	5.130	13.09	-6.040	-1498.
.3924E-03	.1097	.1762	-.3714E-04	.3233E-01
.0	.0	.0	.0	.0
.1154E-03	.2897E-01	-.4914E-02	-.2414E-04	-.1011
-.1491E-04	.1303E-02	.3766E-03	-.1575E-02	.5228E-01

F100 MODEL-MN=0.9, ALT=65K, PLA= 83- GROUP 2 POINT 9 12/01/75 JHK

THE A MATRIX

-.4469	.3821E-01	6.242	430.8	-692.6	-.5713	.1136	-.7413E-01
-.4353E-01	-.5711	136.1	-232.4	-317.3	5.014	.1920	-.1836
.1001	.5632	-171.5	-42.25	765.5	-12.02	-.6614	.2718
.4203E-01	-.1353E-01	128.7	-593.1	58.03	-1.600	-.2702	-.3530
.6596E-03	-.1533E-02	.7112E-02	1.575	-10.11	.2384E-01	-.3944E-02	-.3156E-02
.8495	-.4147E-01	-2.469	-17.52	242.7	-19.48	-.2901	-.1066
.6598	-.8979E-01	-8.434	-31.64	536.1	.7942	-20.54	-.1927
-.8637E-01	1.047	174.1	68.74	-751.1	30.47	1.037	-19.56
-.7756E-02	-.1711E-01	2.774	5.411	-65.44	1.114	.9600E-01	7.362
-.1134E-03	-.2521E-03	.4069E-01	.7901E-01	-.9712	.1652E-01	.1422E-02	.1091
-1.128	-6.983	449.7	889.1	-.1007E+05	175.0	13.40	40.08
-.3978E-01	-.5892	-539.9	2072.	-294.5	4.771	.3129	10.75
-.1761E-02	-.2619E-01	-24.00	92.08	-13.09	.2121	.1394E-01	.4779
-.1854	-.3128	-244.8	200.3	1572.	3.255	.2077	4.952
-.1271E-01	.2412E-01	-1.692	-3.504	33.58	-.5913	19.80	.9602E-01
-2.017	1.779	-80.94	1139.	2472.	-43.81	-3.677	-2.159

.1108	.2751	-.3709	.9194	1.108	-.5077E-01	.7765E-01	.3228E-01
1.108	1.427	-.3530	.5275E-01	.4748	.5077E-01	.1059	.7532E-01
-.1452	-1.307	.3969	-.1884	-1.718	-.1951	-.4306	-.2726
-.3229	-.8769	.4864	-.9044E-01	-.8139	-.9353E-01	-.2400	-.1291
-.2908E-03	-.9162E-02	-.4468E-02	-.1467E-02	-.1336E-01	.4511E-02	.7128E-04	-.2140E-02
-.5769E-01	-.5227	-.4717E-01	-.7285E-01	-.6783	-.7269E-01	-.1468	-.1076
-.1043	-.9388	-.7482E-01	-.1357	-1.230	-.1384	-.4758	-.1951
.2407	2.173	.1971	.3175	2.849	.3324	.7807	.4519
-49.98	.1891	39.11	.2261E-01	.1922	.2940E-01	.5294E-01	.3049E-01
-.6663	-.6638	.5795	.3349E-03	.2864E-02	.4276E-03	.8000E-03	.4543E-03
3.139	28.25	-44.90	4.105	37.12	4.280	10.09	5.884
-8.910	-8.408	37.95	-49.94	.7348	.9754E-01	.1694	.1130
-.3960	-.3735	1.687	-1.997	-1.967	.4329E-02	.7623E-02	.5021E-02
-4.076	-3.800	17.41	-2.910	-2.433	-19.70	.9035E-01	.8393E-01
-.1184E-01	-.1066	.6181E-02	-.1507E-01	-.1402	-.1657E-01	-20.04	-.2224E-01
-.2694	-7.333	-3.339	-1.151	-10.42	28.20	18.78	-51.65

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THE B MATRIX
-.2957     -2.624     -10.88      .3276      298.8
-.9877     -99.82      .1646     -3.635      1753.
 2.981      187.4     -.6935     -.3552E-01-9215.
 1.177      49.30     -1.282     -.6619     -839.6
 .1593E-01-8.924       .2898E-01-.2131E-01-12.38
 .8018     -5.899      10.01     -.3788     -737.9
 1.624      79.12      9.907     -2.506     -1547.
-3.859     -102.8      1.541      15.52      3293.
 .1978     -14.90      .1608      .9372E-01-7356.
 .2915E-02-.2327       .2487E-02  .1334E-02-109.0
 9.773     -3249.      35.96      12.37      .1451E+06
 .3765     -59.65      .3145     -.1608E-01-6547.
 .1656E-01-2.679       .1441E-01-.7217E-03-290.8
 .1151     -71.40      .9185      .2463E-02-2404.
 .2123      11.57     -.8458     -.1020     -222.1
 15.66      793.2     -104.9     -5.894     -.1438E+05

THE C MATRIX
 .1866E-01-.7246E-01 6.536      116.0     -17.59      1.714      .8150E-01-.3237E-01
 .1521E-02 .1492E-05 .8670E-04 .6441E-03-.7716E-02-.8927E-05 .8889E-05 .4413E-05
 .0        .0        .0        .0        .0        .0        .0        .0
 .8244E-04 .2442E-04 .2203E-02 .1047E-01-.1203     -.2197E-03 .1579E-03 .6828E-04
 .1604E-04 .1504E-03-.3382E-01-.1260E-01 .1424     -.3042E-02-.1900E-03-.8222E-04

 .6591E-01 .2001     -.1939     .2165E-01 .2012     .3974     .3237     .3224E-01
 .2388E-05 .2149E-04 .2033E-05 .3140E-05 .2826E-04 .3340E-05 .4412E-05 .4483E-05
 .0        .0        1.000     .0        .0        .0        .0        .0
 .3697E-04 .3333E-03 .3012E-04 .4837E-04 .4366E-03 .5051E-04 .1189E-03 .6929E-04
-.4454E-04-.4011E-03-.3617E-04-.5814E-04-.5249E-03-.6070E-04-.1430E-03-.8327E-04

THE D MATRIX
-.3435     -7.950      1.854     -.6923E-01 428.3
 .1966E-03 .5060E-01 .6593E-01 .3347E-04 .3077E-01
 .0        .0        .0        .0        .0
-.5280E-03-.1454E-01-.1091E-01 .4648E-03 .4341
 .9591E-03 .7483E-01-.7723E-03-.5931E-02-1.124
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F100 MODEL-MN=2.5, ALT=65K, PLA=230- GROUP 2 POINT 10 12/04/75 JHK

THE A MATRIX

-2.476	.5503	-4.106	382.9	-503.1	-6.178	-1.740	-.4427
-.6138	-1.850	112.4	-231.1	-17.01	8.234	-.7930	-.6316
2.142	2.311	-160.1	3.820	86.69	-18.97	3.042	1.331
.4433	.7170E-01	146.0	-541.7	163.8	-.1176	1.523	.2622
-.5929E-02	-.1530E-01	-1.094	-2.912	-21.13	-.7854E-01	-.1409	-.7633E-01
.8334	-.1257	1.570	2.222	16.92	-18.69	.5056	.3609E-01
.9342	-.4255	5.721	7.223	55.67	4.956	-18.35	.1173
-1.103	.6529	71.70	-7.431	-57.24	24.31	-1.708	-20.12
-.3721E-01	-.9385E-02	-.3835	-.8681E-01	-2.904	.3152	-.5286E-01	5.565
-.5489E-03	-.1376E-03	-.5715E-02	-.1158E-02	-.4148E-01	.4674E-02	-.7689E-03	.8245E-01
-7.543	-7.552	48.21	-51.22	-390.7	65.61	-11.64	39.06
.1029E-01	-.3379	-193.0	703.1	1.867	.0	.4325E-01	8.502
.4644E-03	-.1501E-01	-8.577	31.25	.8296E-01	.9410E-04	.2018E-02	.3778
-.2153E-01	-.3202	-87.15	91.92	421.6	1.210	-.4469	3.761
.2111E-03	.1359E-01	-.4512E-01	.1736	.8296	-.1110	19.95	.6824E-01
-4.387	3.057	-22.97	-692.1	2607.	-21.49	11.26	2.759

.6006E-01	-1.343	-1.085	2.231	.4841	-.2935	-.2971	-.4330
3.251	3.452	-1.147	.3074E-01	.2997	.3202E-01	.6230E-01	.1493E-01
.4456E-01	.3836	1.658	.6148E-01	.5072	.6136E-01	.1102	.3122E-01
-.3022	3.941	2.134	.7044	6.317	.7310	1.313	.4045
-.4845E-01	-.4553	-.5340E-01	-.6731E-01	-.6049	-.7021E-01	-.1255	-.1914E-01
.2480E-01	.2232	.2152E-01	.3279E-01	.2859	.3415E-01	.6134E-01	.1737E-01
.8176E-01	.7254	.6995E-01	.1081	.9636	.1126	.1994	.5647E-01
-.8447E-01	-.7463	-.7197E-01	-.1117	-.9867	-.1163	-.2051	-.5809E-01
-50.00	-.8718E-02	39.99	-.1281E-02	-.6916E-01	-.8004E-02	-.2396E-02	-.6787E-03
-.6667	-.6668	.5925	-.1708E-04	-.9221E-03	-.1067E-03	-.3195E-04	-.9049E-05
-.5764	-5.100	-48.79	-.7621	-6.743	-.7937	-1.421	-.4025
-9.707	-9.660	39.32	-49.99	.5763E-01	.1334E-01	.1198E-01	.8823E-02
-.4314	-.4293	1.748	-1.999	-1.997	.6403E-03	.5751E-03	.4072E-03
-4.437	-4.757	17.74	-2.645	-3.177	-20.00	-.2473	.2905
.2325E-02	.1744E-01	.1110E-01	.3074E-02	.2305E-01	.3202E-02	-19.99	.1357E-02
-.2276	8.256	6.591	.9811	12.41	11.91	14.53	-47.68

```
THE B MATRIX
 .7918      -100.7     -25.96      23.66     -4531.
-.3201      -67.32     -7.536     -53.63      2537.
-.1903E-01  171.7      27.26      109.2     -.1505E+05
-2.132      169.3      8.823      23.10      .1090E+05
 .2088      -33.48     -.4835     -1.739    -935.0
-.1106       34.62      .5624     -5.415     951.5
-.4677       79.76      11.61     -19.83     3343.
 .6449      -65.90     -14.45     -24.80    -4500.
 .1539      -6.108     -.5274     -2.138    -5085.
 .2267E-02-.8769E-01-.7744E-02-.3137E-01-75.25
 24.63      -734.7     -99.98     -391.8     .4541E+05
 .3613      -7.133     -.9621E-02-.7538     -5603.
 .1598E-01-.3195       -.1876E-03-.3310E-01-248.7
 .4232      -46.58      1.287     -9.770    -3675.
-.7800E-02  1.675      -.3853E-02 .7303      52.59
-5.209       705.7     -66.54      165.7     .1762E+05

THE C MATRIX
-.4349E-01-.7546       6.345      174.2      119.5      5.675     -1.897     -.5752
 .1204E-01 .9695E-03-.1588E-01-.2225E-01-.1703      -.1323E-01-.5091E-02-.3630E-03
 .0         .0         .0         .0         .0         .0         .0         .0
-.1701E-05 .4987E-04-.6859E-03-.9610E-03-.7358E-02-.5699E-03-.2193E-03-.1565E-04
 .1223E-03 .1402E-03-.8501E-02 .8296E-03 .6340E-02-.7578E-03 .1886E-03 .1347E-04

 .6602E-01-1.565      -1.275     -.2697     -2.423     -.2779     -.5053      1.762
-.2506E-03-.2234E-02-.2155E-03-.3330E-03-.2939E-02-.3435E-03-.6170E-03-.1748E-03
 .0         .0         1.000      .0         .0         .0         .0         .0
-.1085E-04-.9651E-04-.9307E-05-.1439E-04-.1265E-03-.1486E-04-.2661E-04-.7512E-05
 .9332E-05 .8331E-04 .8034E-05 .1235E-04 .1095E-03 .1282E-04 .2296E-04 .6485E-05

THE D MATRIX
 .8519      -270.9     -.3589     -42.12    -4964.
 .1533E-02-.2363       .1710      .4581E-01-10.59
 .0         .0         .0         .0         .0
 .5710E-04-.1183E-01-.3274E-02 .2241E-02-.4269
-.3755E-04 .1156E-01 .1613E-02-.3407E-02 .3315
```

F100 MODEL-0.9/10K,PLA=36,   -EXTRA POINT 1-1/23/76 FAA

THE A MATRIX

-4.025	.8886	2.084	473.9	-701.3	-9.293	-2.743	-.5067
-.9088	-3.868	109.3	-222.0	-73.86	18.19	-1.070	-1.263
2.931	4.174	-154.1	-30.54	251.4	-45.89	3.949	1.797
.6953	.5157D-01	119.8	-583.2	286.7	-1.510	1.967	-.9501D-01
.1946D-01	-.6496D-02	.2107	2.434	-7.432	.1262	.7932D-02	.1154D-01
.5651	-.1209	.1029	-2.856	29.05	-18.80	.4796	-.8155D-01
.4031	-.3323	.3653	-6.425	65.75	3.014	-18.92	-.1781
-.8018	.6064	41.90	6.901	-71.46	29.05	-1.179	-19.81
-.2104D-01	-.2645D-02	.1930	.1983	-1.758	.3489	-.1795D-01	5.934
-.3140D-03	-.4114D-04	.2744D-02	.2644D-02	-.2620D-01	.5175D-02	-.2872D-03	.8791D-01
-5.538	-7.309	49.20	47.94	-490.9	86.09	-8.089	41.65
.1759D-01	-.2653	-85.76	311.8	1.345	-.2279	.1436D-01	9.010
.7788D-03	-.1179D-01	-3.812	13.86	.5793D-01	-.1011D-01	.7180D-03	.4005
.1382D-02	-.2027	-38.63	28.08	208.5	.8844	-.1494	4.146
-.7663D-02	.1596D-01	-.1081	-.1388	1.572	-.1794	19.95	.7601D-01
-2.464	1.047	-5.171	168.0	44.27	-13.17	1.946	-1.031

.7794	1.463	-2.586	6.059	6.950	-.4010D-01	-.6652	.1499
7.951	10.03	-2.586	.3165	2.880	.3901	.4077	.4401
-.6271	-5.458	2.878	-.8105	-7.325	-.9734	-.8941	-1.136
-1.265	3.414	4.173	.8035	7.169	.9150	1.867	1.112
.1759D-01	.1082	-.1362D-01	.1526D-01	.1381	.5397D-01	.6664D-01	.2120D-01
-.5471D-01	-.4692	-.3611D-01	-.6957D-01	-.6449	-.8603D-01	-.5722D-01	-.9672D-01
-.1254	-1.078	-.8114D-01	-.1600	-1.453	-.1969	-.1330	-.2263
.1352	1.161	.8917D-01	.1739	1.565	.2165	.1445	.2418
-50.00	.0	39.78	.6957D-02	.6261D-01	.7291D-02	.1073D-01	.0
-.6666	-.6667	.5893	.9276D-04	.8348D-03	.9721D-04	.1431D-03	.0
.9342	8.071	-47.44	1.198	10.78	1.480	1.001	1.673
-10.28	-10.52	39.40	-49.99	.9392D-01	-.1823D-01	.3219D-01	.1451D-01
-.4570	-.4678	1.751	-2.000	-1.996	-.8020D-03	.1431D-02	.6770D-03
-4.687	-4.682	18.03	-2.724	-2.536	-19.90	.2232	.3869D-01
-.3613D-02	-.2323D-01	.1115D-01	-.6957D-03	-.6261D-02	-.5104D-02	-20.00	-.4836D-02
.1510	-3.170	-2.514	-.5565	-4.993	24.19	25.06	-50.77

AD-A033 532 PRATT AND WHITNEY AIRCRAFT GROUP WEST PALM BEACH FLA --ETC F/G 21/5
F100 MULTIVARIBLE CONTROL SYSTEM ENGINE MODELS/DESIGN CRITERIA.(U)
NOV 76 R J MILLER, R D HACKNEY F33615-75-C-2048
UNCLASSIFIED FR-7809 AFAPL-TR-76-74 NL

2 OF 2
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THE B MATRIX

-.2950	-57.07	-47.86	12.31	2229.
-.5593	68.01	-8.823	.1721	4846.
1.630	-85.55	28.40	52.65	-.3461E+05
-1.394	495.6	9.070	12.74	6844.
-.2803E-01	-47.14	.3372	.1222E-01	125.2
.1204	-.1434	1.907	-2.456	-500.2
.2950	-11.21	6.415	-6.058	-1320.
-.3695	-8.152	-7.723	-24.75	1637.
.4887E-01	-.1692	-.2175	-.4081	-4166.
.7398E-03	-.1941E-02	-.3286E-02	-.6181E-02	-61.83
9.960	26.70	-54.93	-103.1	.6488E+05
.1726	-1.979	.1386	-.1712	-5154.
.7669E-02	-.8840E-01	.6124E-02	-.7385E-02	-229.0
.9333E-01	-40.82	1.456	-.6220	-2428.
.4625E-02	-.3692	-.1436	.2243	-22.83
1.035	-114.9	-36.61	10.96	-3369.

THE C MATRIX

-.1309	-.5076	5.310	103.5	111.7	5.665	-.8915	-.3173
.3323E-01	.2485E-02	-.2058E-02	.5385E-01	-.5559	-.2307E-01	-.9141E-02	.1509E-02
.0	.0	.0	.0	.0	.0	.0	.0
.6528E-04	.4980E-04	-.4089E-04	.1082E-02	-.1115E-01	-.4629E-03	-.1834E-03	.3031E-04
.1056E-03	.1959E-03	-.5248E-02	-.9049E-03	.9269E-02	-.1623E-02	.1525E-03	-.2514E-04
.1291E-03	.4241E-05	.4221E-03	.2115E-02	-.2159E-01	.1377E-03	.4197E-04	.5954E-04
.3709E-04	.7389E-05	.6984E-04	.5139E-03	-.5266E-02	.3218E-04	.4500E-04	.1454E-04
.3080	.2527	-1.208	-.1224E-01	-.1102	1.956	1.867	-.1238E-01
.1055E-02	.9102E-02	.6869E-03	.1346E-02	.1215E-01	.1663E-02	.1122E-02	.1883E-02
.0	.0	1.000	.0	.0	.0	.0	.0
.2112E-04	.1829E-03	.1381E-04	.2701E-04	.2440E-03	.3341E-04	.2247E-04	.3785E-04
-.1768E-04	-.1524E-03	-.1154E-04	-.2265E-04	-.2035E-03	-.2804E-04	-.1865E-04	-.3171E-04
.4150E-04	.3588E-03	.2679E-04	.5275E-04	.4778E-03	.6546E-04	.4409E-04	.7359E-04
.1011E-04	.8778E-04	.6465E-05	.1288E-04	.1154E-03	.1590E-04	.1074E-04	.1785E-04

THE D MATRIX

.1532E-01	-257.1	-.3162	-7.944	153.5
-.2363E-02	.9979E-02	.4474	.4759E-01	10.72
.0	.0	.0	.0	.0
-.4878E-04	.1202E-02	-.1904E-02	.9605E-03	.2092
.4610E-04	-.4100E-03	.1025E-02	-.4246E-02	-.1992
-.9815E-04	.1052E-01	.6298E-03	.4425E-03	.4183
-.2377E-04	.2330E-02	.5000E-03	.2017E-03	.1026

F100 MODEL-0.9/10K,PLA=52,   -EXTRA POINT 2-1/23/76 FAA

THE A MATRIX

-4.343	.7056	1.542	433.1	-702.7	-8.164	-2.314	-.8657
-1.361	-4.398	112.5	-235.2	-124.4	18.43	-1.792	-1.943
4.045	5.252	-150.8	6.710	373.4	-52.26	5.569	3.634
.6494	.3938D-01	119.1	-536.5	83.06	-4.766	.5219	-1.219
.1915D-01	-.9720D-02	.1394	1.901	-7.930	.1304	-.5800D-02	.9832D-03
.5470	-.1177	.8103	.8525	34.51	-18.54	.5260	.4087D-01
.4935	-.2483	1.621	1.705	68.08	3.030	-18.96	.8396D-01
-.8413	.4875	30.93	-1.958	-78.77	29.22	-1.207	-20.10
-.3102D-01	-.1152D-01	.1542	.3947D-01	-2.596	.4171	-.3777D-01	6.095
-.4591D-03	-.1704D-03	.2331D-02	.5263D-03	-.3807D-01	.6199D-02	-.5493D-03	.9031D-01
-6.603	-7.979	29.79	-15.83	-619.0	85.40	-9.500	38.57
-.2106D-01	-.3199	-73.35	268.8	-1.990	.3385	-.5493D-01	9.179
-.9447D-03	-.1422D-01	-3.260	11.94	-.8998D-01	.1504D-01	-.2472D-02	.4079
-.1152	-.2021	-33.35	19.77	215.7	.7713	-.1071	4.197
-.7285D-02	.2003D-01	-.7815D-01	.6315D-01	2.146	-.2051	19.93	.8842D-01
-2.444	1.346	.2262	151.0	175.2	-13.41	2.932	-.1709

.6608	-.1058	-3.012	6.879	5.739	-.7378	-.5332	-.1942
8.792	8.423	-3.181	-.5998D-01	-.6251	-.8680D-01	-.3350	-.9269D-01
.2234	2.032	4.133	.2967	2.756	.3639	1.217	.4237
-2.135	-1.884	4.271	.4104D-01	.3409	.1002	.1504	.6179D-01
.1187D-01	.5173D-01	-.2248D-01	.6552D-02	.5850D-01	.5149D-01	.5376D-01	.9138D-02
.2916D-01	.2624	.2473D-01	.3851D-01	.3523	.4207D-01	.1326	.5385D-01
.5455D-01	.4995	.5027D-01	.7324D-01	.6705	.8547D-01	.2625	.1024
-.6208D-01	-.5926	-.5838D-01	-.8334D-01	-.7955	-.1008	-.3021	-.1165
-50.00	-.1058D-01	39.69	.3157D-02	-.1421D-01	.0	-.1025D-01	.4414D-02
-.6666	-.6668	.5880	.4209D-04	-.1894D-03	.0	-.1367D-03	.8827D-04
-.5044	-4.635	-48.43	-.6740	-6.180	-.7962	-2.403	-.9600
-10.17	-10.19	39.13	-50.01	.2841D-01	.6677D-02	-.6836D-02	.4414D-02
-.4518	-.4529	1.739	-2.000	-1.999	.2671D-03	-.4101D-03	.1765D-03
-4.654	-4.707	17.90	-2.938	-2.938	-19.77	-.1641D-01	-.1765D-02
.1881D-02	.1693D-01	.1581D-01	.2525D-02	.2273D-01	.2671D-02	-19.99	.3531D-02
.7584	2.127	-2.106	.2305	2.159	26.47	25.21	-49.66

THE B MATRIX

.1940	-158.0	-81.44	9.923	-780.8
.1775	-108.2	-23.43	-22.65	2266.
-.4927	341.9	69.52	79.68	-.3299E+05
-.2826E-01	35.97	6.762	7.712	2345.
-.9207E-02	-59.99	.4995	-.9193E-01	55.76
-.6185E-01	39.51	3.980	-1.636	323.8
-.1204	72.99	11.38	-3.431	654.7
.1367	-80.91	-14.41	-18.92	-885.1
.5597E-01	-.4902	-.5323	-.5795	-4842.
.8252E-03	-.4972E-02	-.7878E-02	-.8567E-02	-71.66
11.19	-634.6	-113.9	-131.8	.5351E+05
.1631	-1.774	-.3751	-.6635	-5787.
.7290E-02	-.8238E-01	-.1693E-01	-.2991E-01	-257.6
.1014	-10.90	.3226	-1.247	-2565.
-.4875E-02	2.506	-.2246	.3309	28.00
-.3967	279.7	-54.76	22.37	3243.

THE C MATRIX

-.8332E-01	-.6537	5.294	94.55	98.04	7.031	-.9218	-.4387
.3495E-01	.2168E-02	-.1463E-01	-.1613E-01	-.6375	-.2694E-01	-.9768E-02	-.7895E-03
.0	.0	.0	.0	.0	.0	.0	.0
.4390E-04	.4131E-04	-.2789E-03	-.3076E-03	-.1216E-01	-.5140E-03	-.1863E-03	-.1505E-04
.1259E-03	.3745E-03	-.4515E-02	.2991E-03	.1181E-01	-.2953E-02	.1810E-03	.1465E-04
.7404E-04	-.1161E-04	-.1211E-03	-.5412E-03	-.2123E-01	.2915E-04	.2146E-05	-.2635E-04
.2635E-04	.6475E-05	-.7094E-04	-.1386E-03	-.5344E-02	-.1684E-04	.3165E-04	-.6721E-05
.3492	.1693E-01	-1.505	-.4950E-01	-.4364	2.424	2.119	-.6991E-01
-.5159E-03	-.4709E-02	-.4700E-03	-.6866E-03	-.6322E-02	-.8054E-03	-.2457E-02	-.9710E-03
.0	.0	1.000	.0	.0	.0	.0	.0
-.9829E-05	-.8996E-04	-.8963E-05	-.1306E-04	-.1203E-03	-.1536E-04	-.4675E-04	-.1851E-04
.9605E-05	.8758E-04	.8720E-05	.1276E-04	.1176E-03	.1505E-04	.4554E-04	.1805E-04
-.1718E-04	-.1572E-03	-.1567E-04	-.2320E-04	-.2086E-03	-.2699E-04	-.8284E-04	-.3215E-04
-.4375E-05	-.4030E-04	-.4014E-05	-.5865E-05	-.5306E-04	-.6920E-05	-.2091E-04	-.8222E-05

THE D MATRIX

.1018	-228.7	1.508	-10.86	-459.6
.1251E-02	-.8035	.7376	.2994E-01	-5.929
.0	.0	.0	.0	.0
.2191E-04	-.1396E-01	-.1794E-02	.5738E-03	-.1204
-.1848E-04	.1265E-01	.2154E-02	.2631E-03	.1102
.3897E-04	-.1715E-01	.2049E-03	-.3460E-03	-.2182
.9678E-05	-.4516E-02	.5446E-03	.6000E-04	-.5353E-01

P100 MODEL-0.9/10K,PLA=67,   -EXTRA POINT 3-1/23/76 FAA

THE A MATRIX

-3.171	.7003	4.768	424.4	-686.3	-7.280	-1.383	-.4864
-.8857	-4.814	131.8	-187.8	-77.96	27.99	2.596	.3429
2.854	5.218	-172.0	-65.31	340.5	-70.02	-1.014	.4479
1.024	.2752	135.8	-513.4	196.8	-1.503	5.040	.8327
.1073D-01	-.1240D-01	.7910D-01	1.732	-8.749	.1435	-.2435D-01	-.1125D-01
.5567	-.9815D-01	.7346	1.184	41.13	-18.50	.5652	.7138D-01
.2328	-.1914	1.331	2.162	70.60	2.711	-19.02	.1260
-.5410	.7243	22.67	-2.522	-80.69	28.31	-1.126	-20.15
-.2696D-01	-.1400D-01	.1685	-.2252	-4.727	.4924	-.6588D-01	6.230
-.3978D-03	-.2053D-03	.2471D-02	-.3003D-02	-.6981D-01	.7309D-02	-.9662D-03	.9230D-01
-5.033	-7.581	20.18	-22.68	-751.9	89.27	-10.48	37.06
-.3167D-01	-.3594	-63.24	237.8	-2.473	1.152	.1285	9.465
-.1403D-02	-.1597D-01	-2.810	10.57	-.1076	.5120D-01	.5797D-02	.4207
-.1397	-.2103	-28.68	23.01	187.3	1.187	.4875D-01	4.367
-.4188D-02	.2200D-01	-.6740D-01	.7722D-01	2.502	-.2534	19.92	.9797D-01
-1.515	1.579	3.008	150.2	216.5	-15.90	3.867	.4566

1.056	2.895	-3.164	8.217	10.55	-.3222	.4260	.4082
11.38	23.58	-2.181	2.041	18.34	2.154	4.365	2.853
-2.156	-19.33	2.720	-2.872	-25.79	-3.014	-5.793	-4.013
-.9562	10.47	6.154	1.971	17.66	2.151	4.528	2.752
.5900D-02	-.8522D-02	-.3227D-01	-.2524D-02	-.2387D-01	.4888D-01	.3630D-01	-.3701D-02
.4317D-01	.3885	.4050D-01	.5772D-01	.5247	.6629D-01	.1887	.8164D-01
.7641D-01	.6955	.6985D-01	.1010	.9299	.1123	.3316	.1447
-.8764D-01	-.8159	-.8099D-01	-.1212	-1.091	-.1338	-.3814	-.1697
-50.01	-.4857D-01	39.59	-.1876D-01	-.1299	-.4603D-02	-.4260D-01	-.2021D-01
-.6668	-.6673	.5865	-.2694D-03	-.1905D-02	-.6138D-04	-.6117D-03	-.2964D-03
-.8116	-7.460	-48.65	-1.113	-10.04	-1.237	-3.562	-1.562
-9.867	-9.237	38.97	-49.91	.8832	.1089	.1835	.1374
-.4385	-.4103	1.732	-1.996	-1.961	.4849D-02	.8257D-02	.6143D-02
-4.506	-4.103	17.88	-2.956	-2.426	-19.70	.1127	.8972D-01
.2159D-02	.1943D-01	.1635D-01	.2886D-02	.2598D-01	.3683D-02	-19.99	.4041D-02
1.136	5.702	-1.832	.7490	6.741	28.20	25.20	-48.95

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THE B MATRIX
-.3658      -347.3     -66.24      11.60       3141.
-2.623      -262.3      2.776      1.261       .2757E+05
 3.839       991.5      23.39      23.47      -.7865E+05
-2.521       319.8      29.41      34.31       .2635E+05
 .3429E-02-80.73        .4162     -.1871      -26.46
-.8475E-01 164.5        3.075     -.4793       598.6
-.1306       164.7      8.116     -.9108       1120.
 .1395      -220.4     -10.14     -9.695      -1667.
 .6187E-01-15.89       -.5600     -.6237      -5585.
 .9085E-03-.2375       -.8215E-02-.9079E-02-82.68
 9.643      -1984.     -94.50     -107.3       .5154E+05
 .2821E-01-8.419        .2274      .3275      -5234.
 .1217E-02-.3677        .1038E-01 .1499E-01-232.2
 .2928E-02-48.16        .8108     -.1839      -1916.
-.3596E-02 8.451       -.2621      .2994       29.59
-.9396       841.2     -47.04      28.54       9156.

THE C MATRIX
-.3660E-01-.6903        6.804      107.8       65.76       9.436      -.3847      -.1859
 .2352E-01 .1043E-02-.7730E-02-.1279E-01-.4302            -.1568E-01-.5937E-02-.7632E-03
 .0         .0          .0         .0          .0          .0          .0          .0
 .1624E-03 .3280E-04-.2416E-03-.4011E-03-.1333E-01-.4864E-03-.1844E-03-.2373E-04
 .8127E-04 .3260E-03-.3455E-02 .3676E-03 .1215E-01-.2529E-02 .1691E-03 .2185E-04
 .7772E-04-.1992E-04-.1047E-03-.5618E-03-.1874E-01 .1353E-03 .6916E-05-.3361E-04
 .1553E-04 .5441E-05-.6401E-04-.1425E-03-.4822E-02-.8959E-05 .2964E-04-.8577E-05

 .6165      2.027      -1.616      .2230       2.041       3.264       2.963       .3162
-.4560E-03-.4104E-02-.4296E-03-.6295E-03-.5666E-02-.6886E-03-.1995E-02-.8815E-03
 .0         .0          1.000      .0          .0          .0          .0          .0
-.1429E-04-.1294E-03-.1324E-04-.1935E-04-.1755E-03-.2150E-04-.6229E-04-.2730E-04
 .1313E-04 .1195E-03 .1208E-04 .1778E-04 .1612E-03 .1982E-04 .5725E-04 .2508E-04
-.2020E-04-.1859E-03-.1883E-04-.2749E-04-.2471E-03-.3064E-04-.8696E-04-.3845E-04
-.5122E-05-.4748E-04-.4830E-05-.7082E-05-.6354E-04-.7897E-05-.2227E-04-.9886E-05

THE D MATRIX
-.2849      -320.4      7.734     -5.996       2720.
 .8496E-03-2.754        .6618      .2182E-02 4.874
 .0         .0          .0         .0          .0
 .2529E-04-.5832E-01-.1796E-02 .1522E-03-.1995
-.2093E-04 .3310E-01 .1534E-02-.7516E-03 .2518
 .3600E-04-.5057E-01 .3552E-03-.5987E-03-.3440
 .9088E-05-.1390E-01 .4448E-03-.2562E-04-.8093E-01
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P100 MODEL-0.9/10K,PLA=83,   -EXTRA POINT 4-1/23/76 FAA

THE A MATRIX

-4.059	.7706	11.93	438.1	-689.6	-2.682	3.624	.9218
-.2873	-8.304	133.6	-204.9	-247.7	42.12	3.915	-.6756
.6760	9.082	-180.4	-73.63	600.9	-100.5	-9.974	.3473
.2920	-.1447D-01	124.9	-606.9	58.68	-13.29	-4.146	-4.262
.1013D-01	-.2058D-01	.1519	2.042	-8.452	.2568	.3047D-01	.5054D-02
.8750	-.9490D-01	-.7904	-3.816	28.00	-19.66	-.5184	-.2475
.4717	-.1701	-1.919	-7.046	54.46	.4596	-20.96	-.5613
-.6098D-01	1.119	17.81	7.596	-57.34	27.73	1.027	-19.50
-.1906D-02	-.3450D-01	.3314	.7447	-4.114	.8259	.1093	6.508
-.2858D-04	-.5095D-03	.4909D-02	.1117D-01	-.6063D-01	.1223D-01	.1619D-02	.9643D-01
-.7310	-9.781	42.34	91.15	-685.0	118.3	12.31	42.75
-.1215D-01	-.4949	-50.78	194.1	-12.78	2.389	.3066	9.684
-.5431D-03	-.2200D-01	-2.257	8.629	-.5673	.1062	.1360D-01	.4304
-.1480	-.2840	-22.98	19.55	154.7	1.837	.2440	4.487
-.1172D-01	.4140D-01	-.1792	-.3816	2.880	-.4815	19.80	.9597D-01
-1.498	2.594	-6.873	92.13	179.5	-29.65	-2.756	-1.763

2.081	11.43	-3.123	11.13	23.40	.8712	3.491	2.092
12.90	21.92	-3.199	1.488	13.48	1.572	3.256	2.051
-2.872	-25.67	3.357	-3.794	-34.10	-4.019	-8.290	-5.184
-4.291	-14.42	4.973	-1.673	-15.07	-1.703	-3.973	-2.294
.1866D-01	.9070D-01	-.3012D-01	.1173D-01	.1086	.7594D-01	.6959D-01	.1632D-01
-.1486	-1.327	-.1224	-.1954	-1.763	-.2082	-.4220	-.2683
-.2743	-2.992	-.2784	-.4422	-3.975	-.4664	-.9827	-.6048
.2979	2.641	.2471	.3933	3.508	.4191	.8621	.5338
-49.97	.2364	39.56	.3365D-01	.3141	.3851D-01	.1115	.4778D-01
-.6662	-.6631	.5860	.4985D-03	.4786D-02	.5843D-03	.1648D-02	.7281D-03
3.556	31.79	-44.85	4.701	42.26	4.980	10.35	6.425
-9.578	-8.950	38.65	-49.89	.9870	.1169	.2623	.1485
-.4257	-.3978	1.718	-1.995	-1.956	.5206D-02	.1158D-01	.6621D-02
-4.358	-3.803	17.74	-2.933	-2.176	-19.67	.2014	.1276
-.1463D-01	-.1317	.5477D-02	-.1944D-01	-.1750	-.2072D-01	-20.04	-.2662D-01
-.1951	-6.383	-3.021	-1.046	-9.310	29.04	18.11	-51.42

THE B MATRIX

-1.580	-1099.	-157.8	18.86	.1516E+05
-1.431	-104.4	24.85	-33.36	.2137E+05
4.044	581.7	-73.27	-.3850	-.1144E+06
1.773	1273.	-27.79	-13.91	-.1352E+05
-.1238E-01	-109.2	.7889	.5183E-01	122.8
.2124	127.4	19.04	-2.396	-1313.
.4481	262.2	30.36	-4.584	-3635.
-.4504	-114.4	9.285	13.53	5774.
.3712E-02	-3.137	.7751	.1986	-5993.
.4748E-04	-.4851E-01	.1152E-01	.2997E-02	-88.77
1.153	-809.1	90.85	7.474	.1390E+06
.2824E-01	-2.609	1.935	.3978	-5526.
.1265E-02	-.9387E-01	.8578E-01	.1769E-01	-245.6
-.1770E-01	-12.90	2.206	.4711	-1598.
.2031E-01	5.426	-1.018	.1186E-01	-181.6
1.121	108.5	-92.16	3.079	-6938.

THE C MATRIX

.2222	-1.203	9.369	124.0	7.743	15.39	2.047	.4016
.1313E-01	.1088E-03	.9281E-03	.4392E-02	-.3282E-01	-.4038E-03	.5729E-03	.2703E-03
.0	.0	.0	.0	.0	.0	.0	.0
.5774E-04	.2834E-04	.2459E-03	.1143E-02	-.8612E-02	-.1091E-03	.1541E-03	.7437E-04
.9426E-05	.2145E-03	-.2698E-02	-.1171E-02	.8816E-02	-.2091E-02	-.1582E-03	-.7635E-04
.1899E-04	-.2290E-04	.3692E-03	.1229E-02	-.9218E-02	.4687E-03	.3086E-03	.7992E-04
.9774E-05	.1137E-04	.6526E-04	.3200E-03	-.2426E-02	.3979E-04	.1014E-03	.2091E-04

1.173	5.966	-1.757	.7964	7.125	4.776	4.461	1.087
.1771E-03	.1446E-02	.1379E-03	.2134E-03	.1921E-02	.2274E-03	.4559E-03	.2922E-03
.0	.0	1.000	.0	.0	.0	.0	.0
.4463E-04	.3985E-03	.3700E-04	.5890E-04	.5294E-03	.6242E-04	.1296E-03	.8054E-04
-.4583E-04	-.4094E-03	-.3798E-04	-.6051E-04	-.5443E-03	-.6415E-04	-.1332E-03	-.8274E-04
.4817E-04	.4305E-03	.3998E-04	.6359E-04	.5719E-03	.6718E-04	.1396E-03	.8701E-04
.1265E-04	.1128E-03	.1048E-04	.1666E-04	.1498E-03	.1761E-04	.3619E-04	.2280E-04

THE D MATRIX

-.8228	-177.1	30.66	2.574	8539.
-.3501E-03	-1.007	.5808	-.4005E-02	-30.67
.0	.0	.0	.0	.0
-.6415E-04	-.2895E-01	-.4069E-02	.7477E-03	.5056
.7151E-04	.2841E-01	-.1505E-02	-.3400E-02	-.8853
-.6809E-04	-.1378E-01	-.1781E-03	.5701E-03	.7169
-.1824E-04	-.4872E-02	.7105E-03	.2362E-03	.1811

F100 MODEL-0.9/30K,PLA=36,   -EXTRA POINT 5-1/23/76 FAA

THE A MATRIX

-1.465	.3013	2.657	406.0	-679.0	-3.383	-1.280	-.3502
-.4677	-2.177	110.9	-236.6	-113.8	10.79	-.7550	-.8644
1.364	2.260	-139.8	5.210	338.9	-25.20	2.388	1.503
.2303	.3096D-01	109.0	-494.1	75.88	-2.413	.1970	-.5719
.6264D-02	-.4771D-02	.5828D-01	1.479	-8.075	.5051D-01	-.1488D-01	-.5550D-02
.4302	-.8336D-01	1.031	2.084	60.53	-18.95	.4547	.2217D-01
.2562	-.2555	3.136	5.330	171.5	3.215	-18.74	.7004D-01
-.6762	.6624	68.54	-5.090	-171.8	29.14	-1.274	-20.07
-.1764D-01	-.1155D-02	.3126	.2004	-3.880	.3180	-.4103D-01	6.217
-.2609D-03	-.1848D-04	.4515D-02	.2672D-02	-.5748D-01	.4674D-02	-.6018D-03	.9209D-01
-5.241	-8.071	61.34	-40.78	-1333.	95.83	-9.930	39.39
.1315D-01	-.2817	-162.1	593.3	4.311	-.1141	.3693D-01	9.422
.5774D-03	-.1252D-01	-7.206	26.37	.1897	-.5055D-02	.1641D-02	.4187
-.1215	-.1660	-73.54	72.74	428.5	.2935	.1149D-01	4.298
-.7570D-02	.1738D-01	-.1667	-.2405	3.794	-.2234	19.91	.7802D-01
-1.941	1.265	2.448	321.3	380.0	-13.90	3.266	-.1529

.3245	.1511	-1.318	3.208	2.962	-.3557	-.7355D-01	-.4264D-01
4.149	4.306	-1.448	.2648D-01	.2383	.1199D-01	-.1634D-01	.3198D-01
.2798D-01	.1763	1.696	.2648D-01	.2383	.7993D-01	.2697	.4264D-01
-.9736	-1.007	1.882	-.1135D-01	-.6808D-01	.1998D-01	.0	-.5330D-02
.1552D-02	-.1111D-01	-.1296D-01	-.2092D-02	-.1899D-01	.1702D-01	.1426D-01	-.3013D-02
.1902D-01	.1360	.1060D-01	.2043D-01	.1838	.3357D-01	.8662D-01	.2878D-01
.4868D-01	.4180	.2650D-01	.6506D-01	.5447	.9112D-01	.2321	.8954D-01
-.4924D-01	-.4029	-.2747D-01	-.6052D-01	-.5447	-.9192D-01	-.2354	-.8954D-01
-49.99	.0	39.62	.0	.0	.5995D-02	-.4086D-02	.0
-.6666	-.6667	.5870	.0	.0	.7993D-04	-.5448D-04	.0
-.3931	-3.273	-48.12	-.4917	-4.425	-.7114	-1.859	-.7008
-10.33	-10.24	39.23	-49.98	.1872	.1599D-01	.2860D-01	.2931D-01
-.4591	-.4552	1.744	-1.999	-1.992	.7194D-03	.1144D-02	.1279D-02
-4.702	-4.628	17.87	-2.865	-2.730	-19.73	-.6538D-01	.1599D-01
-.1679D-02	-.4029D-01	.9637D-02	-.6052D-02	-.5447D-01	-.2398D-02	-20.01	-.3198D-02
.7764	2.165	-2.142	.2402	2.111	25.65	26.35	-49.67

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THE B MATRIX
 .1193      -67.73      -22.92      1.682       597.2
 .5533E-02-39.59      -5.061      -2.714       1517.
-.1244      172.0       14.35       25.69      -.1378E+05
 .4787E-01 14.83       1.281       2.278       540.6
 .7653E-02-24.68        .1130      -.5985E-01-18.01
-.8184E-01 40.45       2.107       -.7300       112.2
-.2431      122.3       8.052      -2.467       435.6
 .2006      -113.0     -6.932      -19.99      -68.32
 .1013      -.3263     -.1751      -.2937      -4206.
 .1517E-02-.5784E-02-.2619E-02-.4435E-02-62.38
 26.54      -735.5     -56.04      -101.4       .5082E+05
 .2374       2.305      .2060       .2145      -5124.
 .1065E-01  .1039      .9037E-02  .9268E-02-227.8
 .1248      -26.81     -.1318      -.2159      -2245.
 .1444E-01 3.773      -.1938       .1143      -13.56
-.8338       429.0     -32.63       12.74       3731.

THE C MATRIX
-.3783E-01-.2915      5.351       90.34       111.9       3.544      -.4094      -.1693
 .1476E-01  .1221E-02-.1559E-01-.2755E-01-.9029       -.1563E-01-.6724E-02-.3657E-03
 .0         .0         .0          .0          .0          .0          .0          .0
 .4667E-04  .4404E-04-.5615E-03-.9921E-03-.3251E-01-.5638E-03-.2418E-03-.1317E-04
 .1172E-03  .4372E-03-.1146E-01  .9182E-03  .2982E-01-.3613E-02  .2219E-03  .1206E-04
 .1142E-03-.1688E-04-.1969E-03-.1818E-02-.5867E-01  .1410E-03-.2194E-04-.2435E-04
 .2981E-04  .4964E-05-.1246E-03-.4564E-03-.1477E-01  .1314E-04  .3200E-04-.5985E-05

 .1790      .1984     -.6623       .3329E-02  .2451E-01 1.106       1.096       .2132E-02
-.2658E-03-.2235E-02-.1446E-03-.3357E-03-.3021E-02-.4846E-03-.1256E-02-.4730E-03
 .0         .0        1.000        .0          .0          .0          .0          .0
-.9583E-05-.8028E-04-.5158E-05-.1218E-04-.1085E-03-.1752E-04-.4523E-04-.1707E-04
 .8873E-05  .7414E-04  .4788E-05  .1114E-04  .9973E-04  .1613E-04  .4198E-04  .1581E-04
-.1762E-04-.1488E-03-.9723E-05-.2256E-04-.2012E-03-.3198E-04-.8411E-04-.3153E-04
-.4412E-05-.3682E-04-.2388E-05-.5550E-05-.4978E-04-.7972E-05-.2059E-04-.7807E-05

THE D MATRIX
 .1257E-01-112.0       .6946      -3.249       2.347
 .9382E-03-1.138       .2255       .3294E-01-11.57
 .0         .0         .0          .0          .0
 .4348E-04-.2535E-01-.1907E-02  .5091E-03-.1249
-.5367E-04  .1755E-01  .1247E-02-.1265E-02  .6224E-01
 .8248E-04-.3443E-01  .4977E-03-.3297E-03-.1759
 .1946E-04-.9656E-02  .4652E-03  .5400E-04-.5638E-01
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F100 MODEL-0.9/30K,PLA=52, -EXTRA POINT 6-1/23/76 FAA

THE A MATRIX

-1.584	.3668	6.689	429.2	-693.1	-4.356	-.5077	-.1106
-.3888	-2.440	136.1	-186.4	-81.75	15.48	1.644	.3514
1.159	2.370	-168.5	-80.82	317.8	-35.02	-1.402	-.2527
.4927	.1507	130.6	-487.1	206.8	-.5662	2.849	.5173
.5589D-02	-.5003D-02	.1526	1.947	-7.711	.8626D-01	.4400D-02	.2601D-02
.5185	-.9712D-01	.5134	-.8261	68.39	-18.48	.3834	-.2053D-01
.3419	-.1943	.9546	-1.404	127.9	2.977	-19.29	-.3080D-01
-.4304	.8391	43.73	1.735	-145.2	27.76	-.8048	-19.96
-.2215D-01	-.9363D-02	.2169	-.1377	-7.475	.4567	-.5305D-01	6.494
-.3281D-03	-.1390D-03	.3134D-02	-.1836D-02	-.1103	.6794D-02	-.7578D-03	.9619D-01
-4.401	-7.254	53.37	17.90	-1485.	94.32	-8.207	38.72
-.1969D-01	-.3583	-125.6	474.5	-3.181	1.121	.1819	9.852
-.8640D-03	-.1593D-01	-5.583	21.09	-.1400	.4997D-01	.8184D-02	.4379
-.1463	-.2071	-57.22	48.52	379.9	1.155	.9397D-01	4.556
-.3828D-02	.2085D-01	-.1519	.5507D-01	4.962	-.2597	19.91	.9477D-01
-1.402	1.528	.9039	275.2	345.3	-17.63	2.823	-.1125

.6510	2.245	-1.589	4.387	6.508	-.6139D-01	.4824	.3814
5.966	13.06	-1.040	1.195	10.75	1.269	2.668	1.703
-1.371	-12.32	1.065	-1.835	-16.51	-1.941	-3.942	-2.620
-.4205	5.966	3.102	1.077	9.634	1.184	2.578	1.530
.8003D-02	.4045D-01	-.1159D-01	.5418D-02	.4869D-01	.3170D-01	.3423D-01	.7787D-02
-.1235D-01	-.1112	-.7342D-02	-.1657D-01	-.1491	-.1228D-01	.2110D-01	-.2361D-01
-.1806D-01	-.1668	-.1183D-01	-.2549D-01	-.2294	-.1910D-01	.4070D-01	-.3451D-01
.2423D-01	.2010	.1591D-01	.3249D-01	.2695	.2660D-01	-.4673D-01	.4631D-01
-50.00	-.3207D-01	39.49	-.4779D-02	-.4301D-01	.3411D-02	-.3768D-02	-.6810D-02
-.6667	-.6671	.5850	-.6371D-04	-.5734D-03	.4548D-04	-.5025D-04	-.9081D-04
.2423	2.117	-47.61	.3249	2.881	.2746	-.4334	.4631
-9.904	-9.183	38.89	-49.89	1.018	.1228	.2563	.1612
-.4401	-.4080	1.729	-1.995	-1.955	.5457D-02	.1146D-01	.7174D-02
-4.535	-4.063	17.89	-3.051	-2.414	-19.67	.1583	.1035
.9503D-03	-.4276D-02	.1346D-01	.1274D-02	.1147D-01	-.6822D-03	-20.00	-.9081D-03
.8066	2.491	-2.168	.2708	2.437	27.57	24.60	-49.61

THE B MATRIX

-.8603	-606.0	-38.56	6.368	2156.
-3.184	-285.6	5.007	2.686	.1333E+05
5.024	777.5	5.348	-1.075	-.3859E+05
-2.879	227.8	20.35	14.88	.1203E+05
-.1390E-01	-34.52	.3560	.2273E-01	55.96
.1084	263.0	2.155	-1.116	98.00
.3412E-01	245.1	7.220	-2.186	187.1
-.9785E-01	-260.9	-9.593	-2.779	210.6
.1108	-12.00	-.5587	-.3394	-5313.
.1632E-02	-.1766	-.8234E-02	-.5006E-02	-78.75
16.71	-2662.	-97.40	-57.57	.6391E+05
-.3026E-01	-21.03	.8802	.7771	-4805.
-.1395E-02	-.9519	.3980E-01	.3493E-01	-213.2
-.4206E-01	-30.62	1.216	.2485	-1833.
-.2768E-02	7.633	-.3733	.1615	21.61
-.9605	459.3	-66.68	16.22	4100.

THE C MATRIX

-.5228E-02	-.3325	7.199	110.8	65.08	4.916	-.1015	-.5086E-01
.1116E-01	.3064E-03	-.1514E-02	.2495E-02	-.2139	-.4742E-02	-.1184E-02	.5430E-04
.0	.0	.0	.0	.0	.0	.0	.0
.1020E-03	.3295E-04	-.1602E-03	.2854E-03	-.2310E-01	-.5120E-03	-.1280E-03	.6180E-05
.7719E-04	.3475E-03	-.7665E-02	-.3133E-03	.2607E-01	-.2926E-02	.1447E-03	-.6835E-05
.6803E-04	-.1838E-04	.2308E-03	.4561E-03	-.3663E-01	.1486E-03	.1072E-03	.9930E-05
.1499E-04	.6794E-05	-.1739E-04	.1217E-03	-.9470E-02	-.1611E-04	.5993E-04	.2593E-05

.3529	1.281	-.8141	.1537	1.397	1.754	1.690	.2205
.3564E-04	.2940E-03	.2294E-04	.4380E-04	.3942E-03	.3837E-04	-.6595E-04	.6810E-04
.0	.0	1.000	.0	.0	.0	.0	.0
.3846E-05	.3372E-04	.2634E-05	.5063E-05	.4557E-04	.4322E-05	-.6900E-05	.7294E-05
-.4246E-05	-.3701E-04	-.2878E-05	-.5545E-05	-.4977E-04	-.4696E-05	.8096E-05	-.8014E-05
.6172E-05	.5293E-04	.4147E-05	.8019E-05	.7217E-04	.6936E-05	-.1069E-04	.1198E-04
.1694E-05	.1441E-04	.1115E-05	.2108E-05	.1897E-04	.1907E-05	-.2668E-05	.3159E-05

THE D MATRIX

-.3881	-163.4	6.207	-1.223	1555.
.9023E-03	.5668	.4493	.3166E-02	2.874
.0	.0	.0	.0	.0
-.1097E-05	-.4088E-01	-.5341E-02	.3917E-03	-.1378
.1353E-04	.4726E-01	.1728E-02	-.2301E-02	.1455E-01
-.4249E-05	-.5368E-01	.5091E-03	-.3427E-04	-.1849E-01
-.4498E-06	-.1296E-01	.7172E-03	.9366E-04	-.2850E-02

F100 MODEL-0.9/30K,PLA=67, -EXTRA POINT 7-1/23/76 FAA

THE A MATRIX

-2.201	.2888	4.578	407.0	-713.3	-3.902	-.5671	-.4913
-.2508	-3.299	125.4	-244.8	-289.1	16.02	-1.113	-1.466
.6325	3.280	-145.1	20.59	710.3	-36.35	3.108	3.127
.2170	-.6866D-02	122.2	-547.7	50.56	-4.546	-.3733	-1.261
.2308D-02	-.8184D-02	.1030D-01	1.441	-9.184	.7554D-01	-.2174D-01	-.1385D-01
.9654	-.6180D-01	1.344	2.993	74.66	-18.81	.4322	.1085
.6313	-.1241	1.587	8.980	128.6	2.376	-19.43	.1005
-.1584	1.046	31.24	-7.562	-169.5	26.22	-.8973	-20.26
-.1000D-01	-.1878D-01	.5945D-01	-.4501	-11.70	.5441	-.7179D-01	6.623
-.1505D-03	-.2800D-03	.7927D-03	-.6752D-02	-.1739	.8019D-02	-.1101D-02	.9811D-01
-1.849	-8.250	12.37	-88.11	-1984.	96.16	-10.46	34.14
-.2437D-01	-.4384	-112.5	417.1	-28.51	1.554	-.1256	9.820
-.1087D-02	-.1948D-01	-5.002	18.54	-1.269	.6902D-01	-.5599D-02	.4364
-.1618	-.2496	-51.51	42.04	330.1	1.353	-.8471D-01	4.527
-.4822D-02	.2779D-01	-.1189D-01	.2026	6.724	-.3064	19.91	.1173
-1.052	1.968	7.313	270.3	461.1	-21.10	3.105	.5921

.5303	.6569	-1.989	4.717	4.872	-.3571	-.1355	.3669D-01
5.483	4.444	-2.090	-.1690	-1.547	-.1970	-.6135	-.2487
.4272	3.922	2.956	.5757	5.284	.6465	1.919	.8275
-1.548	-2.937	2.592	-.2320	-2.062	-.2401	-.5207	-.3302
-.1009D-02	-.4387D-01	-.2164D-01	-.7064D-02	-.6398D-01	.2193D-01	.4212D-02	-.1019D-01
.6355D-01	.5642	.5961D-01	.8477D-01	.7630	.9544D-01	.2768	.1190
.5668D-01	.5217	.5703D-01	.7446D-01	.7114	.8928D-01	.3296	.1101
-.1537	-1.403	-.1380	-.2051	-1.846	-.2284	-.6277	-.2960
-50.01	-.1159	39.36	-.1718D-01	-.1418	-.1539D-01	-.3923D-01	-.2446D-01
-.6668	-.6685	.5830	-.2673D-03	-.2234D-02	-.2463D-03	-.6182D-03	-.3805D-03
-1.780	-16.17	-49.32	-2.386	-21.72	-2.635	-7.244	-3.412
-9.810	-9.874	38.56	-50.02	-.2191	-.6157D-02	-.6063D-01	-.1019D-01
-.4360	-.4390	1.714	-2.001	-2.010	-.3079D-03	-.2711D-02	-.4892D-03
-4.511	-4.498	17.75	-3.199	-3.253	-19.74	-.3424D-01	.1631D-02
.7729D-02	.5024D-01	.2281D-01	.1031D-01	.6702D-01	.1170D-01	-19.97	.1060D-01
1.231	6.251	-1.854	.8306	7.565	29.44	24.67	-48.80

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THE B MATRIX
 .2157E-01-223.5     -74.10      2.375     -277.4
 .5678     -15.82    -8.139    -27.07      648.3
-1.516      65.69     22.03     32.91     -.2146E+05
 .6232      114.2    -2.642     .4141     -1414.
 .1868E-01-37.98      .1151    -.1367     -76.13
-.2184      33.66     21.02    -.8417E-01 1553.
-.2910      82.60     25.30    -.5327E-01 1991.
 .5137     -18.54    -6.101     3.687     -1842.
 .1349      3.215    -.4624    -.5426     -6172.
 .2029E-02 .5796E-01-.7080E-02-.8187E-02-91.46
 20.97      181.3    -72.98    -96.02      .5002E+05
 .2956     -1.615    -.8980    -1.226     -6791.
 .1316E-01-.7040E-01-.4024E-01-.5461E-01-301.8
 .1603      5.963     .1501    -.9370     -2908.
-.2450E-01-.8056    -.2742      .3477      119.3
-2.152     -88.43    -47.43     24.44      .1242E+05

THE C MATRIX
 .3693E-01-.4391     5.175      105.6      17.69      5.681     -.2791     -.2998
 .6468E-02 .5301E-05-.1301E-03-.4923E-03-.7060E-02-.9845E-04-.3141E-04-.1604E-04
 .0        .0        .0        .0        .0        .0        .0        .0
 .4551E-04 .2190E-04-.4438E-03-.1139E-02-.2581E-01-.4171E-03-.1352E-03-.3997E-04
 .2815E-04 .2691E-03-.5550E-02 .1340E-02 .3019E-01-.2332E-02 .1587E-03 .4691E-04
 .7026E-05-.3220E-04-.3100E-03-.1545E-02-.3494E-01 .2362E-03 .5487E-04-.5397E-04
 .7236E-05 .5656E-05-.1492E-03-.4182E-03-.9378E-02-.1243E-04 .4169E-04-.1459E-04

 .2669     .2226    -1.059     -.7790E-02-.8248E-01 1.862      1.378     -.9131E-02
-.9393E-05-.8453E-04-.8049E-05-.1253E-04-.1128E-03-.1347E-04-.3121E-04-.1783E-04
 .0        .0        1.000     .0        .0        .0        .0        .0
-.2307E-04-.2098E-03-.2088E-04-.3094E-04-.2815E-03-.3421E-04-.9397E-04-.4426E-04
 .2701E-04 .2458E-03 .2448E-04 .3623E-04 .3299E-03 .4005E-04 .1103E-03 .5182E-04
-.3119E-04-.2842E-03-.2821E-04-.4221E-04-.3837E-03-.4643E-04-.1266E-03-.5996E-04
-.8365E-05-.7675E-04-.7608E-05-.1136E-04-.1035E-03-.1253E-04-.3448E-04-.1619E-04

THE D MATRIX
 .3418E-01-36.14     5.643     -3.991     -93.00
-.1121E-03-.2275     .3113      .4912E-02-13.14
 .0        .0        .0        .0        .0
 .7793E-04-.6176E-02-.3654E-02 .5683E-06-.4671
-.8364E-04 .7869E-02 .1033E-02-.2745E-02 .2704
 .1091E-03 .6103E-02-.5733E-03-.6403E-03-.4560
 .2857E-04 .1150E-02 .3299E-03-.3642E-04-.1298
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F100 MODEL-MN=0.0,ALT=0K,PLA=20-GROUP3 POINT2 MAX HP&BLD 1/21/76 FAA

THE A MATRIX

-2.339	1.095	-24.99	640.2	-1205.	-14.32	-3.626	-1.802
-.5812	-3.933	139.3	-250.9	-157.5	26.76	-1.215	-1.304
1.318	5.238	-149.2	54.16	357.4	-45.39	2.770	2.446
.2784	.2381	112.2	-815.7	622.5	-2.374	.6292	-.1180
.8551D-02	-.1291D-01	.1748	2.957	-24.44	.1174	-.5206D-02	-.2990D-02
.4137	-.2251	7.693	14.37	129.3	-16.77	1.012	.4217
.4395	-.3463	10.15	18.21	155.9	4.638	-18.76	.5182
-.4874	.1855	52.86	-15.12	-132.1	28.11	-1.047	-20.43
-.1482D-01	-.2996D-01	-.5235	-.4421	-4.571	.4593	-.4369D-01	6.553
-.2234D-03	-.4458D-03	-.7911D-02	-.7369D-02	-.6703D-01	.6817D-02	-.6408D-03	.9706D-01
-6.249	-23.59	140.4	-194.9	-1691.	216.8	-13.45	34.53
.2578D-01	-.1562	-200.2	603.6	6.246	-.6196	.6554D-01	9.991
.1134D-02	-.6944D-02	-8.900	26.83	.2742	-.2756D-01	.2796D-02	.4441
.4536D-01	-.1834	-89.59	38.91	300.6	.7348	-.6991D-01	4.444
-.4640D-02	.4183D-01	-.1955	.4421	3.778	-.3397	19.96	.8476D-01
-2.412	4.442	-.9075	725.6	90.65	-35.46	4.312	1.183

-.7024	-8.309	-1.881	1.224	-8.662	-1.209	-2.971	-1.630
3.007	.5419	-1.496	-.4050	-3.606	-.3694	-.8974	-.5318
.6991	6.322	2.079	.9189	8.231	.8478	2.056	1.207
-.5118	1.264	1.804	.2918	2.626	.3232	.7580	.3831
.2841D-02	.6774D-03	-.1153D-01	-.2094D-03	-.2425D-02	.1638D-01	.1624D-01	-.5937D-03
.2562	2.324	.2309	.3414	3.026	.3131	.7545	.4415
.3144	2.848	.2866	.4181	3.755	.3887	.9235	.5478
-.2669	-2.426	-.2418	-.3528	-3.159	-.3265	-.7806	-.4598
-50.01	-.1054	39.38	-.6533D-02	-.1372	-.1679D-01	-.2614D-01	-.1716D-01
-.6668	-.6683	.5834	-.1161D-03	-.2090D-02	-.2518D-03	-.4066D-03	-.2669D-03
-3.450	-31.14	-50.89	-4.529	-40.51	-4.189	-10.05	-5.936
-8.933	-8.700	38.54	-49.95	.3724	.2308D-01	.4792D-01	.4575D-01
-.3970	-.3865	1.713	-1.998	-1.984	.1007D-02	.2091D-02	.2059D-02
-4.040	-4.130	17.29	-1.354	-1.497	-20.00	.3833D-01	-.2287D-01
.7359D-02	.4817D-01	.1838D-01	.1045D-01	.6271D-01	.1007D-01	-19.98	.1258D-01
1.664	10.22	-1.633	1.396	12.64	25.36	29.98	-48.17

THE B MATRIX

4.617	-145.4	-10.38	1.350	-3956.
.8863	-65.57	-2.839	-38.30	-58.74
-2.777	119.5	6.524	66.86	-6497.
-1.057	33.49	1.831	6.608	1370.
-.3562E-03	-19.34	.5937E-01	-.1537	4.067
-1.241	39.95	1.217	.4368	1158.
-1.656	47.12	1.867	-.3387	1495.
1.391	-34.59	-2.448	-14.04	-1484.
.1603	-2.574	-.8023E-01	-.8140	-3958.
.2416E-02	-.3741E-01	-.1229E-02	-.1206E-01	-58.69
44.46	-675.9	-30.65	-315.2	.3537E+05
.3129	2.969	.1573	1.271	-4651.
.1400E-01	.1334	.6939E-02	.5662E-01	-207.1
.2914	-3.246	.3032	-1.074	-2121.
-.3382E-01	.9608	-.2846E-01	.6125	63.26
-5.059	167.2	-15.13	61.43	6209.

THE C MATRIX

.1321	-.2508	1.499	49.32	300.6	2.009	-.2850	-.1914
.1692E-01	.1659E-02	-.7299E-01	-.1391	-1.216	-.3039E-01	-.9628E-02	-.3997E-02
.0	.0	.0	.0	.0	.0	.0	.0
-.3793E-04	.6687E-04	-.2370E-02	-.4518E-02	-.3952E-01	-.9878E-03	-.3125E-03	-.1300E-03
.2245E-03	.1661E-02	-.2368E-01	.7005E-02	.6073E-01	-.1330E-01	.4834E-03	.2010E-03
.2622E-04	-.1844E-05	-.1480E-02	-.3814E-02	-.3317E-01	-.2419E-03	-.1252E-03	-.1103E-03
.1378E-04	-.3979E-05	-.2869E-03	-.8147E-03	-.7040E-02	.1282E-04	.4440E-06	-.2348E-04

-.3214E-01	-.6156	-.2738	-.9803E-01	-.8666	.2109	.1161	-.1232
-.2461E-02	-.2230E-01	-.2220E-02	-.3231E-02	-.2905E-01	-.2993E-02	-.7182E-02	-.4239E-02
.0	.0	1.000	.0	.0	.0	.0	.0
-.7991E-04	-.7234E-03	-.7218E-04	-.1050E-03	-.9430E-03	-.9731E-04	-.2333E-03	-.1376E-03
.1239E-03	.1119E-02	.1117E-03	.1626E-03	.1457E-02	.1505E-03	.3613E-03	.2130E-03
-.6749E-04	-.6091E-03	-.6101E-04	-.8798E-04	-.7932E-03	-.8169E-04	-.1970E-03	-.1157E-03
-.1435E-04	-.1283E-03	-.1298E-04	-.1873E-04	-.1671E-03	-.1730E-04	-.4214E-04	-.2438E-04

THE D MATRIX

.3936	-22.30	.8186	-3.650	-461.2
.1331E-01	-.3276	.9834E-01	-.5636E-02	-13.69
.0	.0	.0	.0	.0
.4030E-03	-.1232E-01	-.4276E-02	-.1450E-03	-.3699
-.3633E-03	.2633E-01	.1116E-02	.1307E-01	.6029
.3256E-03	-.1051E-01	-.2098E-03	-.8111E-03	-.2966
.6995E-04	-.2136E-02	.7532E-04	-.2110E-03	-.6485E-01

F100 MODEL-0.9/10K,PLA=20,   -GROUP3 POINT4 1/23/76 FAA

THE A MATRIX

-2.693	1.583	-17.45	454.8	-824.9	-19.35	-6.282	-1.578
-.5770	-3.383	117.0	-246.0	-60.75	18.99	-1.631	-1.166
1.424	3.895	-122.0	29.68	160.5	-33.51	4.266	2.081
.1775	.9563D-02	99.35	-610.3	372.8	-.8634	.3133	-.3097
.6900D-02	-.9105D-02	.2885D-01	1.799	-10.87	.6668D-01	-.2466D-01	-.9371D-02
.3919	-.1512	2.309	6.099	26.37	-18.30	.6812	.1404
.6089	-.6090	9.234	21.27	97.81	7.549	-17.42	.5024
-.5994	.2108	47.59	-16.83	-73.10	27.89	-1.918	-20.40
-.5694D-02	.5285D-02	-.3556	-.3050	-.6903	.1609	-.3213D-01	5.326
-.8225D-04	.7718D-04	-.5471D-02	-.4066D-02	-.9204D-02	.2355D-02	-.4820D-03	.7889D-01
-4.178	-10.55	24.15	-118.2	-511.3	94.55	-13.40	40.37
.1485	.4281	-162.0	547.4	18.64	-3.214	.4780	8.472
.6605D-02	.1903D-01	-7.202	24.33	.8283	-.1428	.2121D-01	.3765
.4213D-01	.6664D-01	-72.81	81.85	266.9	-.3406	-.1446D-01	3.763
-.3796D-03	.1701D-01	.3282D-01	.3659	1.243	-.1350	19.98	.6292D-01
-.9495	1.212	9.245	310.0	-63.85	-9.281	3.013	.3509

-.5094	-7.927	-2.256	2.193	-7.997	-1.543	-2.557	-1.664
4.896	3.725	-1.809	-.1959	-1.677	-.2019	-.4008	-.2439
.5094	4.585	2.317	.6879	6.234	.7018	1.371	.9068
-1.079	-.1273	2.286	.1624	1.634	.3268	.4008	.2314
-.6054D-03	-.3761D-01	-.1775D-01	-.6248D-02	-.5459D-01	.1352D-01	.1808D-01	-.7833D-02
.1026	.9233	.9183D-01	.1385	1.247	.1394	.2597	.1814
.3672	3.305	.3223	.4968	4.514	.5037	.9492	.6579
-.2908	-2.617	-.2514	-.3927	-3.543	-.3980	-.7456	-.5166
-50.01	-.4776D-01	40.11	-.7166D-02	-.6449D-01	-.7210D-02	-.1203D-01	-.9381D-02
-.6667	-.3673	.5942	-.9554D-04	-.8599D-03	-.9613D-04	-.1603D-03	-.1251D-03
-2.043	-18.34	-50.21	-2.756	-24.87	-2.797	-5.223	-3.630
-11.45	-10.79	39.98	-49.90	.6879	.1106	.1323	.1001
-.5090	-.4795	1.777	-1.996	-1.969	.4903D-02	.5932D-02	.4503D-02
-5.183	-5.164	17.96	-2.038	-2.107	-19.87	.4650D-01	-.1126D-01
.6367D-02	.5731D-01	.1541D-01	.8599D-02	.6879D-01	.8652D-02	-19.99	.1126D-01
1.038	4.967	-1.467	.6545	5.826	21.25	31.13	-49.14

THE B MATRIX

4.585	-284.6	-18.36	23.75	-8335.
.4596	-90.78	-4.629	-48.09	477.7
-2.134	189.7	11.90	74.30	-7253.
-.5247	165.0	1.743	3.510	1622.
.2138E-01	-28.04	.4460E-01	-.1966	-40.26
-.4909	30.81	-.2077	-1.988	848.9
-1.837	93.96	5.688	-9.154	3437.
1.390	-76.89	-5.223	-12.79	-2739.
.8927E-01	-2.426	-.5773E-01	-.4023	-2520.
.1311E-02	-.2897E-01	-.8385E-03	-.5845E-02	-37.40
33.26	-641.0	-36.19	-213.7	.1626E+05
-.1285	21.91	1.302	7.486	-3077.
-.5809E-02	.9758	.5794E-01	.3329	-136.6
.1084	-4.539	.7187	.7280	-1620.
-.3086E-01	1.840	.1797E-01	.3565	72.20
-2.269	57.53	-6.479	26.11	4691.

THE C MATRIX

-.2684	-.4124	3.570	75.40	216.3	3.711	-.3701	-.1860
.1820E-01	.2440E-02	-.4787E-01	-.1216	-.5272	-.3442E-01	-.1382E-01	-.2862E-02
.0	.0	.0	.0	.0	.0	.0	.0
-.5802E-04	.9771E-04	-.1628E-02	-.4132E-02	-.1794E-01	-.1172E-02	-.4704E-03	-.9748E-04
.1522E-03	.8903E-03	-.1194E-01	.4312E-02	.1865E-01	-.7010E-02	.4889E-03	.1018E-03
.5792E-05	.3643E-04	-.2212E-02	-.7295E-02	-.3162E-01	-.7786E-03	-.3890E-03	-.1727E-03
.1006E-04	.3148E-05	-.4815E-03	-.1660E-02	-.7233E-02	-.9893E-04	-.4758E-04	-.3928E-04

.1081	-.2429	-.5573	-.6043E-01	-.6329	.6635	.9338	-.9450E-01
-.2092E-02	-.1882E-01	-.1820E-02	-.2827E-02	-.2550E-01	-.2878E-02	-.5366E-02	-.3717E-02
.0	.0	1.000	.0	.0	.0	.0	.0
-.7125E-04	-.6412E-03	-.6192E-04	-.9635E-04	-.8682E-03	-.9769E-04	-.1823E-03	-.1266E-03
.7451E-04	.6695E-03	.6470E-04	.1007E-03	.9091E-03	.1021E-03	.1908E-03	.1326E-03
-.1263E-03	-.1136E-02	-.1100E-03	-.1703E-03	-.1533E-02	-.1725E-03	-.3216E-03	-.2245E-03
-.2871E-04	-.2584E-03	-.2500E-04	-.3878E-04	-.3491E-03	-.3924E-04	-.7345E-04	-.5100E-04

THE D MATRIX

.2035	-140.6	-2.175	-8.056	-370.0
.1054E-01	-.4813	.1388	.3371E-01	-19.98
.0	.0	.0	.0	.0
.3402E-03	-.1984E-01	-.3334E-02	.1306E-02	-.6344
-.2627E-03	.3470E-01	.1272E-02	.1034E-01	.4944
.5941E-03	-.3515E-01	-.8763E-03	-.2561E-03	-1.118
.1358E-03	-.7915E-02	-.2783E-04	-.1496E-03	-.2569

F100 MODEL-0.9/30K,PLA=20,   -GROUP3 POINT5 1/23/76 FAA

THE A MATRIX

-1.021	.4550	3.790	424.8	-673.0	-5.331	-1.713	-.3547
-.2267	-1.939	102.9	-227.6	-72.56	11.40	-.7265	-.6476
.5860	1.948	-116.1	-.6627	183.7	-20.66	1.830	.9252
.9727D-01	.5917D-01	103.6	-478.5	219.0	-.8371	.7355	.5654D-01
.4511D-02	-.4619D-02	-.1475D-01	1.344	-8.050	.3796D-01	-.1678D-01	-.6770D-02
.3437	-.1282	-.6891D-01	-1.458	51.63	-18.67	.5041	-.2467D-01
.2685	-.3617	.8614D-01	-2.319	128.7	4.025	-18.73	-.3290D-01
-.4121	.6496	83.70	2.054	-127.5	28.61	-1.258	-19.97
-.4823D-02	.6376D-02	-.7753	-.3313	-1.926	.1806	-.2691D-01	5.716
-.7503D-04	.9521D-04	-.1149D-01	-.4418D-02	-.2997D-01	.2643D-02	-.4186D-03	.8467D-01
-2.859	-9.053	30.92	12.76	-887.8	103.0	-8.745	42.39
.6150D-01	-.9054D-01	-226.8	799.7	20.87	-1.983	.1973	8.808
.2733D-02	-.4030D-02	-10.08	35.54	.9247	-.8829D-01	.6611D-02	.3914
-.5129D-01	-.1270	-103.1	106.1	478.5	.3525D-01	-.6279D-01	3.989
-.4823D-02	.1581D-01	-.1723D-01	-.6627D-01	2.569	-.1815	19.94	.6168D-01
-1.418	1.090	3.101	366.8	44.95	-12.51	1.686	-.7325
.2336	-.3186	-1.178	2.220	1.520	-.2701	-.3667	-.1250
3.030	2.995	-1.105	-.9653D-02	-.8688D-01	-.1000D-01	-.8944D-01	-.1316D-01
-.1062D-01	-.1274	1.175	-.1448D-01	-.1303	-.5001D-02	.1520	-.1974D-01
-.4921	1.466	1.697	.3330	2.997	.4001	.6350	.4474
-.8070D-03	-.2631D-01	-.1155D-01	-.4357D-02	-.3807D-01	.8577D-02	.7818D-02	-.5879D-02
-.1628D-01	-.1529	-.1411D-01	-.2317D-01	-.2085	-.1500D-01	.2683D-01	-.3158D-01
-.2620D-01	-.2039	-.1964D-01	-.3089D-01	-.3215	-.3101D-01	.6082D-01	-.4211D-01
.2266D-01	.2167	.2087D-01	.3282D-01	.2954	.2801D-01	-.6618D-01	.4474D-01
-50.01	-.3186D-01	39.89	-.4827D-02	-.4344D-01	-.1250D-01	-.1342D-01	-.6579D-02
-.6668	-.6671	.5909	-.6436D-04	-.5792D-03	-.2001D-03	-.1789D-03	-.8772D-04
.1469	1 418	-48.08	.2148	1.976	.1801	-.4964	.2928
-10.71	-10.64	39.61	-50.00	.0	-.7502D-02	.4025D-01	.0
-.4760	-.4735	1.761	-2.000	-2.001	-.4001D-03	.1789D-02	-.1316D-03
-4.873	-4.907	17.99	-2.543	-2.702	-19.86	.2683D-01	-.1842D-01
-.7080D-03	-.6372D-02	.7978D-02	-.9653D-03	-.8688D-02	-.1000D-02	-20.00	-.1316D-02
.3275	-1.625	-2.321	-.3379	-3.041	21.94	28.03	-50.45

THE B MATRIX

.5452	-1.743	-3.555	6.522	-417.2
.1518	20.42	-1.972	-16.87	591.6
.1641	-6.723	4.454	29.81	-7541.
-1.794	25.25	1.626	4.627	2327.
.2425E-01	-15.62	.2665E-01	-.1021	-24.48
.9312E-01	5.502	-1.807	-2.123	-126.9
.1441	1.651	.4930	-6.004	-172.6
-.3734	-27.33	-2.715	-12.51	567.9
.1486	-1.270	-.5519E-01	-.3030	-2876.
.2222E-02	-.1727E-01	-.8548E-03	-.4558E-02	-42.61
36.96	22.31	-21.00	-146.2	.3872E+05
.2894	-2.795	.4601	2.890	-3844.
.1311E-01	-.1397	.2024E-01	.1275	-170.9
.2302	-20.36	.4583	-.1955	-1772.
.2764E-02	-.2713	-.4422E-01	.2336	30.80
1.832	6.554	-12.14	14.73	-1606.

THE C MATRIX

-.7010E-01	-.2439	2.281	76.04	178.4	2.587	-.3399	-.1576
.1137E-01	.1330E-02	-.4307E-03	.9112E-02	-.6104	-.1573E-01	-.5993E-02	.1542E-03
.0	.0	.0	.0	.0	.0	.0	.0
.1414E-03	.9315E-04	-.2818E-04	.6132E-03	-.4036E-01	-.1042E-02	-.3966E-03	.1042E-04
.7500E-04	.1927E-03	-.1467E-01	-.3519E-03	.2330E-01	-.2401E-02	.2292E-03	-.6074E-05
.1008E-03	.1113E-04	.2391E-03	.1004E-02	-.6562E-01	-.7458E-04	-.8034E-04	.1669E-04
.3349E-04	.4558E-05	.4942E-04	.2160E-03	-.1543E-01	.1876E-04	.2696E-04	.3576E-05
.8248E-01	-.2045	-.4574	-.4904E-01	-.4796	.5677	.6917	-.6684E-01
.1040E-03	.9757E-03	.9205E-04	.1478E-03	.1330E-02	.1219E-03	-.3354E-03	.2015E-03
.0	.0	1.000	.0	.0	.0	.0	.0
.6966E-05	.6511E-04	.6150E-05	.9863E-05	.8961E-04	.8193E-05	-.2190E-04	.1344E-04
-.4002E-05	-.3749E-04	-.3611E-05	-.5739E-05	-.5112E-04	-.4689E-05	.1271E-04	-.7774E-05
.1147E-04	.1035E-03	.1007E-04	.1567E-04	.1442E-03	.1316E-04	-.3743E-04	.2136E-04
.2541E-05	.2217E-04	.2135E-05	.3358E-05	.3033E-04	.2735E-05	-.9105E-05	.4578E-05

THE D MATRIX

.2788	-60.37	-.6627	-4.265	-263.6
-.5091E-03	-.7951E-02	.9035E-01	.2291E-01	.5704
.0	.0	.0	.0	.0
-.4724E-04	-.1004E-01	-.4161E-02	.1679E-02	-.9659E-01
.8124E-04	.1063E-01	.4422E-03	-.3851E-02	-.1098
-.8410E-04	.8114E-02	.1481E-03	.2440E-03	.9517E-01
-.1807E-04	.1581E-02	.2194E-03	.8816E-04	.2160E-01

F100 MODEL-0.9/30K,PLA=83, -GROUP3 POINT6 1/23/76 FAA

THE A MATRIX

-2.329	.1111	4.397	403.0	-824.5	-1.834	.8456	-.6736
-.1354	-2.851	131.8	-218.8	-385.2	15.63	2.510	-.7348
.3097	2.887	-175.5	-56.54	909.0	-49.08	-6.832	.9117
.4622	.8425D-01	138.1	-534.3	186.0	-2.714	1.826	-.4422D-01
.2666D-02	-.8553D-02	-.2182D-01	1.345	-10.33	.7899D-01	-.2451D-01	-.2165D-01
.8065	-.3914D-01	-1.945	-8.435	71.97	-20.19	-.6523	-.2830
.6132	-.5790D-01	-.7909	-4.690	199.7	.7039D-01	-21.34	-.1136
-.5065D-01	.8963	35.21	13.98	-161.6	31.39	1.569	-19.53
-.3652D-02	-.1015D-01	.5895	1.205	-13.91	.7885	.1141	6.810
-.5519D-04	-.1506D-03	.8679D-02	.1792D-01	-.2062	.1169D-01	.1700D-02	.1009
-.5827	-6.029	84.53	162.7	-2080.	119.1	18.29	41.62
-.1631D-01	-.4538	-97.77	375.4	-47.40	2.514	.3154	10.04
-.7305D-03	-.2017D-01	-4.346	16.68	-2.105	.1117	.1396D-01	.4461
-.1665	-.2471	-44.69	44.60	283.0	1.730	.1799	4.595
-.1656D-01	.2696D-01	-.3979	-.7786	9.257	-.5225	19.75	.1014
-2.016	1.586	-21.74	155.6	522.9	-33.37	-6.379	-2.674
.5050	.7020D-01	-2.258	5.033	4.476	-.4750	-.3063	-.1001
6.524	9.477	-1.856	.4947	4.383	.5223	1.032	.6829
-1.088	-9.723	2.049	-1.432	-12.89	-1.528	-3.130	-1.977
-.9184	4.124	3.656	.8315	7.530	.9001	2.211	1.148
-.4338D-02	-.7898D-01	-.2727D-01	-.1221D-01	-.1115	.1944D-01	-.1188D-01	-.1709D-01
-.1665	-1.492	-.1338	-.2202	-1.958	-.2317	-.4994	-.3039
-.7059D-01	-.6213	-.5507D-01	-.9066D-01	-.7833	-.9445D-01	-.1318	-.1266
.2718	2.446	.2213	.3569	3.212	.3828	.8110	.4984
-49.98	.1843	39.38	.2720D-01	.2448	.2917D-01	.7325D-01	.3754D-01
-.6664	-.6640	.5833	.3972D-03	.3730D-02	.4445D-03	.1110D-02	.5482D-03
3.184	28.46	-45.09	4.200	37.74	4.482	9.472	5.797
-9.558	-9.135	38.41	-49.93	.7110	.7917D-01	.1731	.8223D-01
-.4248	-.4061	1.707	-1.997	-1.968	.3500D-02	.7724D-02	.3647D-02
-4.397	-4.237	17.64	-3.075	-2.830	-19.73	.2530D-01	.3075D-01
-.1521D-01	-.1334	.7009D-02	-.1969D-01	-.1725	-.2111D-01	-20.05	-.2717D-01
-.6678	-10.84	-3.464	-1.690	-15.12	29.08	15.82	-52.32

THE B MATRIX

.1796	-702.2	-60.21	1.276	-616.6
-1.020	-358.7	5.762	-25.61	7673.
3.353	754.1	-17.38	8.336	-.5151E+05
-1.723	-328.7	14.94	10.78	9802.
.2634E-01	-44.94	.9772E-01	-.1694	-113.4
.4187	210.0	7.650	-1.803	-1362.
.2517	438.0	8.861	-3.540	-3147.
-.8726	-113.3	4.624	15.60	5252.
.2786E-01	-7.590	.3187	-.3118E-01	-6418.
.4111E-03	-.1166	.4732E-02	-.3852E-03	-95.09
2.629	-2027.	55.26	-10.16	.1327E+06
.1013	-9.522	.7203	-.1516	-5941.
.4518E-02	-.4101	.3182E-01	-.7027E-02	-264.2
.6723E-01	92.41	.5984	-.2356	-1907.
.4375E-01	11.24	-1.114	.6133E-01	-210.7
3.701	702.1	-113.6	-2.118	-.1769E+05

THE C MATRIX

.7722E-01	-.4282	5.215	108.6	-77.55	6.624	.2577	-.4507
.7789E-02	.8377E-05	.3070E-03	.1622E-02	-.1586E-01	.5499E-04	.1468E-03	.5953E-04
.0	.0	.0	.0	.0	.0	.0	.0
.1995E-03	.1330E-04	.4597E-03	.2032E-02	-.2636E-01	.4595E-04	.2270E-03	.6830E-04
.7960E-05	.1156E-03	-.5560E-02	-.2219E-02	.2818E-01	-.1373E-02	-.2498E-03	-.7446E-04
.2516E-04	-.2067E-04	.6696E-03	.1963E-02	-.2503E-01	.5912E-03	.3473E-03	.6565E-04
.1172E-04	.6537E-05	.9373E-04	.5006E-03	-.6472E-02	.7284E-04	.1120E-03	.1685E-04
.2421	-.2696	-1.263	-.8662E-01	-.7609	2.030	1.059	-.1156
.3412E-04	.3071E-03	.2086E-04	.4533E-04	.4080E-03	.4862E-04	.8323E-04	.6257E-04
.0	.0	1.000	.0	.0	.0	.0	.0
.3983E-04	.3563E-03	.3206E-04	.5256E-04	.4717E-03	.5609E-04	.1184E-03	.7259E-04
-.4349E-04	-.3886E-03	-.3521E-04	-.5731E-04	-.5155E-03	-.6114E-04	-.1294E-03	-.7918E-04
.3822E-04	.3427E-03	.3089E-04	.5066E-04	.4523E-03	.5380E-04	.1138E-03	.6982E-04
.9797E-05	.8835E-04	.7977E-05	.1304E-04	.1154E-03	.1380E-04	.2921E-04	.1800E-04

THE D MATRIX

.1630	129.0	7.852	-4.273	-217.6
.1335E-03	.2647	.3533	.2998E-03	.4622
.0	.0	.0	.0	.0
-.1052E-03	-.2490E-01	.4735E-02	.5999E-03	.5573
.1314E-03	.2945E-01	-.7567E-03	-.1895E-02	-.7096
-.1093E-03	-.1446E-01	.2111E-02	.3015E-03	.5805
-.2738E-04	-.2601E-02	.7796E-03	.1779E-03	.1430

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THE A MATRIX

-1.147	.7423D-01	8.621	432.6	-791.0	-.3834	.7169	-.5314D-01
-.1210	-1.510	129.7	-235.9	-427.8	7.497	.7591	-.6767
.2822	1.589	-162.5	-11.23	1010.	-23.62	-1.863	1.329
.5575D-01	-.8680D-01	119.4	-597.1	28.25	-4.011	-1.574	-1.290
.2608D-02	-.3631D-02	.7630D-01	1.705	-9.348	.5449D-01	.1265D-02	-.4155D-02
.8065	-.1563D-01	-.2791	3.817	154.3	-19.65	-.2263	-.3543D-01
.6158	-.2121D-02	-.5482	-16.95	431.6	.1264	-20.43	-.5527D-01
-.9985D-01	.8623	62.12	4.715	-362.0	30.84	.6944	-19.95
-.8960D-02	-.1571D-01	.7226	.5613	-31.16	.7384	.6677D-01	6.972
-.1327D-03	-.2330D-03	.1063D-01	.7485D-02	-.4634	.1093D-01	.9840D-03	.1033
-1.339	-6.965	102.4	64.27	-4851.	115.4	9.393	36.46
-.2788D-01	-.4988	-194.5	736.0	-108.5	2.623	.2530	10.24
-.1234D-02	-.2217D-01	-8.645	32.71	-4.825	.1166	.1125D-01	.4553
-.1685	-.2639	-88.47	73.27	556.8	1.876	.2179	4.739
-.1434D-01	.3024D-01	-.4684	-.4116	20.90	-.4927	19.79	.1233
-1.854	1.986	-7.824	453.8	1369.	-29.97	-1.518	-.1506

.4183	1.578	-.9988	2.950	4.373	.8482D-02	.4044	.2671
3.103	3.263	-1.086	.2905D-01	.3090	.3110D-01	-.4183D-01	.4025D-01
-.7569D-01	-.5916	1.428	-.8714D-01	-.8794	-.9330D-01	.4183D-01	-.1171
-1.155	-4.321	1.222	-.5229	-4.706	-.5598	-1.346	-.7245
.1642D-02	-.4681D-02	-.1032D-01	-.1022D-02	-.8834D-02	.1541D-01	.7394D-02	-.1400D-02
.5418D-01	.5056	-.1293D-01	.7447D-01	.6702	.8086D-01	-.8366D-02	.1061
-.1621	-1.481	-.1293D-01	-.2181	-1.996	-.2335	.1116D-01	-.3015
.3665D-01	.2725	.1804D-01	.4014D-01	.3850	.4298D-01	.4183D-02	.5269D-01
-50.00	.3586D-01	39.26	.5282D-02	-.2377D-01	.5655D-02	.1394D-01	.1098D-01
-.6666	-.6662	.5816	.7042D-04	-.3169D-03	.7540D-04	.1859D-03	.1464D-03
.4741	3.845	-47.35	.5664	5.288	.6149	.1708	.7720
-9.394	-9.233	38.24	-49.98	.1664	.1979D-01	.4880D-01	.3476D-01
-.4175	-.4102	1.699	-1.999	-1.993	.8482D-03	.2231D-02	.1537D-02
-4.296	-4.066	17.59	-3.256	-2.828	-19.73	.6414D-01	.4830D-01
-.3585D-02	-.2510D-01	.1804D-01	-.3697D-02	-.4278D-01	-.3958D-02	-20.00	-.5122D-02
.7659	2.178	-2.273	.2179	2.056	31.10	20.98	-49.69

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THE B MATRIX
-.8256     -235.2     -25.58     1.208      2175.
-.4780E-01-10.65     -.8495     -16.23      1397.
 .6197     -32.90     1.911      12.68     -.1876E+05
 2.286      196.1    -8.312     -4.894     -4997.
 .4227E-02-24.02      .1383     -.5094E-01-1.751
-.1378     -27.03     10.32      .2015     -181.8
 .4916      345.1     8.152      1.368      710.4
-.4137      50.36    -.6706      11.81      2053.
 .1598      9.177    -.8476E-01-.3778     -6801.
 .2391E-02 .1320     -.1286E-02-.5708E-02-100.8
 21.18      206.9    -6.023     -61.31      .9448E+05
 .4206      15.64    -.3345E-01-1.327     -6796.
 .1869E-01 .6888     -.1393E-02-.5875E-01-302.1
 .2038      16.09     .5754     -.6366     -3457.
 .1685E-01 .3777     -.8304      .1816     -85.07
-.8435     -309.8    -82.81      20.48      1735.
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THE C MATRIX
 .7697E-01-.1988      8.141      119.8     -49.34      3.835      .5491     -.2551E-01
 .4325E-02 .1718E-05 .0         .0        -.1401E-01-.1331E-04 .3075E-04 .0
 .0        .0        .0         .0         .0         .0         .0         .0
 .1987E-03 .7321E-05 .6156E-04 .8045E-03-.6199E-01-.8211E-04 .1196E-03 .8719E-05
 .1879E-04 .1350E-03-.1069E-01-.9059E-03 .6805E-01-.1355E-02-.1321E-03-.9731E-05
 .1893E-04-.2823E-04 .5082E-03 .7624E-03-.5686E-01 .4907E-03 .2400E-03 .8079E-05
 .1053E-04 .4964E-05-.2299E-04 .1978E-03-.1458E-01 .4436E-04 .8523E-04 .2102E-05

 .2381      .9265     -.5363      .1128      1.034      1.196      .9527      .1551
 .0         .0         .0         .0         .0         .0         .0         .0
 .0         .0         1.000      .0         .0         .0         .0         .0
 .5957E-05 .4749E-04 .2879E-05 .7021E-05 .6563E-04 .7545E-05 .1872E-05 .9647E-05
-.6682E-05-.5414E-04-.3199E-05-.7956E-05-.7404E-04-.8559E-05-.2145E-05-.1088E-04
 .5398E-05 .4491E-04 .2655E-05 .6608E-05 .6040E-04 .7124E-05 .1855E-05 .9165E-05
 .1415E-05 .1199E-04 .6647E-06 .1767E-05 .1561E-04 .1898E-05 .4085E-06 .2439E-05
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THE D MATRIX
-.4944      29.82      6.570     -.7046      1539.
 .2230E-03 .2024      .1799      .3696E-03 1.544
 .0        .0         .0         .0         .0
 .1284E-05 .2310E-01 .5854E-03 .1698E-03 .5221
 .4855E-04-.1762E-02 .9896E-04-.1677E-02-.1824
-.2962E-04 .1251E-01 .1359E-02-.2230E-03 .1285
-.6789E-05 .4453E-02 .5857E-03 .4831E-04 .3095E-01
```

F100 MODEL-0.9/45K,PLA=52, GROUP 4 POINT 2-2/11/76 FAA

THE A MATRIX

-1.165	.1580	2.875	415.6	-733.1	-2.457	-.7012	-.3125
-.3869	-1.373	117.9	-266.3	-279.6	6.154	-1.481	-1.019
.8829	1.377	-135.1	35.80	613.4	-16.45	2.726	1.672
.1161	-.3755D-01	112.5	-560.6	46.90	-2.575	-.5751	-.8157
.3512D-02	-.2675D-02	.1227	1.880	-7.949	.4747D-01	.7356D-04	-.3537D-04
.8046	-.9194D-01	.3225	-2.652	125.5	-18.78	.3214	-.3328D-01
.4195	-.1766	.8835	-5.039	226.2	2.359	-19.40	-.6087D-01
-.4284	.8696	76.72	5.622	-275.2	29.07	-.7484	-19.93
-.2339D-01	-.7122D-02	.5259	.5304	-15.12	.5024	-.5121D-01	6.745
-.3449D-03	-.1065D-03	.7947D-02	.7072D-02	-.2263	.7431D-02	-.7353D-03	.9991D-01
-4.744	-7.226	95.22	61.93	-3055.	108.4	-8.205	38.40
-.6440D-01	-.4232	-243.1	890.7	-48.44	1.056	-.2403	9.941
-.2862D-02	-.1881D-01	-10.81	39.58	-2.160	.4678D-01	-.1071D-01	.4418
-.1753	-.2404	-111.6	81.37	705.4	1.133	-.1970	4.554
-.6495D-02	.2080D-01	-.1963	.3182	9.257	-.2936	19.91	.9496D-01
-2.017	1.491	-10.97	492.8	554.2	-22.98	1.071	-1.031

.1924	-.1496	-.9518	2.086	1.657	-.2378	-.2429	-.8220D-01
2.368	.4061	-1.143	-.3270	-2.971	-.3601	-.8774	-.4749
.3349	3.035	1.446	.4508	4.057	.4925	1.324	.6485
-.8479	-2.651	1.053	-.3016	-2.714	-.3057	-.6580	-.4293
.3319D-02	.1374D-01	-.6714D-02	.1727D-02	.1647D-01	.1543D-01	.1541D-01	.2467D-02
-.1948D-01	-.1753	-.1383D-01	-.2603D-01	-.2343	-.2378D-01	-.1880D-01	-.3745D-01
-.3895D-01	-.3249	-.2562D-01	-.4825D-01	-.4343	-.4620D-01	-.1567D-01	-.6850D-01
.4085D-01	.3677	.3010D-01	.5460D-01	.4914	.5299D-01	.1253D-01	.7855D-01
-50.00	.5344D-01	39.36	.7936D-02	.7143D-01	.3397D-02	-.7834D-02	.1142D-01
-.6666	-.6660	.5831	.1058D-03	.9523D-03	.4529D-04	-.1045D-03	.1522D-03
.4786	4.211	-47.31	.6159	5.543	.5978	.2115	.8859
-9.809	-10.17	38.55	-50.07	-.5143	-.5435D-01	-.2350	-.7535D-01
-.4360	-.4523	1.713	-2.003	-2.023	-.2446D-02	-.1050D-01	-.3379D-02
-4.516	-4.737	17.72	-3.147	-3.463	-19.79	-.1285	-.4658D-01
.2850D-02	.2565D-01	.1424D-01	.3809D-02	.3428D-01	.2717D-02	-20.00	.5480D-02
.2945	-2.277	-2.703	-.4286	-3.857	26.86	23.01	-50.62

THE B MATRIX

.2939	-163.0	-26.36	.7511	-478.9
1.724	-145.5	-12.12	-7.770	-1122.
-2.194	372.8	24.22	11.45	-8209.
1.653	118.8	-2.577	-1.298	-1676.
-.9635E-02	-18.51	.1699	-.7787E-02	15.07
.1287	113.9	5.149	-.8654	108.5
.2454	181.6	8.431	-1.531	-105.9
-.3824	-221.2	-8.609	-.4141	543.3
.1810	-9.551	-.4960	-.2337	-5587.
.2705E-02	-.1468	-.7365E-02	-.3406E-02	-82.78
29.61	-2423.	-95.28	-45.81	.7460E+05
.8531	-21.88	-2.135	-1.085	-6722.
.3803E-01	-.9824	-.9510E-01	-.4860E-01	-299.1
.5054	-30.87	-.6140	-.8878	-2996.
-.9389E-02	7.694	-.3712	.1293	-19.16
2.498	582.4	-82.61	7.225	-2142.

THE C MATRIX

-.1354E-02	-.1839	4.187	102.6	32.26	2.536	-.3466	-.1856
.6968E-02	.6259E-04	-.3068E-03	.1492E-02	-.8485E-01	-.8291E-03	-.2314E-03	.2029E-04
.0	.0	.0	.0	.0	.0	.0	.0
.1299E-03	.3164E-04	-.1412E-03	.8786E-03	-.4342E-01	-.4247E-03	-.1164E-03	.1099E-04
.8213E-04	.3374E-03	-.1484E-01	-.1068E-02	.5288E-01	-.3268E-02	.1420E-03	-.1349E-04
.8835E-04	-.1849E-04	.5331E-03	.1372E-02	-.6731E-01	.3326E-03	.1297E-03	.1762E-04
.2101E-04	.6689E-05	.1335E-04	.3639E-03	-.1758E-01	.2397E-04	.6582E-04	.4667E-05

.9417E-01	-.1441	-.5043	-.3908E-01	-.3677	.7985	.5964	-.5731E-01
.1188E-04	.1069E-03	.8897E-05	.1587E-04	.1429E-03	.1486E-04	.4896E-05	.2283E-04
.0	.0	1.000	.0	.0	.0	.0	.0
.6651E-05	.5887E-04	.4910E-05	.8742E-05	.7868E-04	.8318E-05	.3022E-05	.1253E-04
-.8153E-05	-.7202E-04	-.6013E-05	-.1070E-04	-.9577E-04	-.1023E-04	-.3519E-05	-.1529E-04
.1032E-04	.9321E-04	.7557E-05	.1384E-04	.1246E-03	.1322E-04	.4648E-05	.2001E-04
.2760E-05	.2468E-04	.1971E-05	.3666E-05	.3299E-04	.3425E-05	.1262E-05	.5273E-05

THE D MATRIX

.1980	-85.22	1.660	-1.508	-172.1
-.8592E-04	-.2085	.2380	.7969E-03	-.8054
.0	.0	.0	.0	.0
-.4570E-04	-.3972E-01	-.5601E-02	.2813E-03	-.3200E-02
.9843E-04	.4441E-01	.1609E-02	-.3257E-02	-.1735
-.7484E-04	-.4987E-01	.1398E-02	-.4821E-04	.1096
-.1949E-04	-.1318E-01	.8159E-03	.6599E-04	.2436E-01

P100 MODEL-0.9/45K,PLA=20,MIN PB PLAP=40,GROUP 4 POINT 3-2/13/76 FAA

THE A MATRIX

-1.032	.1553	2.924	432.7	-642.6	-2.188	-.5463	-.1695
-.3147	-1.204	114.1	-232.4	-104.5	7.092	-.3600	-.4452
.9161	1.029	-143.4	-5.491	316.3	-13.34	1.182	.7820
.1532	.3940D-02	110.3	-499.3	79.98	-1.282	.1482	-.3029
.3784D-02	-.2147D-02	.7682D-01	1.578	-7.823	.2758D-01	-.6155D-02	-.2396D-02
.5322	-.9530D-01	2.234	.3295	125.6	-18.44	.5040	.1808D-02
.4479	-.2083	4.372	.4759	231.1	3.043	-19.07	.9493D-02
-.8045	1.071	122.9	-.4759	-289.9	25.63	-1.162	-20.01
-.2105D-01	.3360D-02	.2397D-01	.3661	-8.038	.3120	-.3600D-01	6.469
-.3119D-03	.4944D-04	.3196D-03	.4881D-02	-.1206	.4610D-02	-.5364D-03	.9583D-01
-6.720	-6.957	137.9	-3.020	-2409.	98.06	-9.671	39.07
-.1045D-01	-.3312	-296.0	1084.	-2.009	.2804	.2117D-02	9.733
-.4616D-03	-.1472D-01	-13.16	48.20	-.8842D-01	.1248D-01	.8470D-04	.4326
-.1079	-.1927	-134.5	87.93	794.1	.7387	-.6437D-01	4.451
-.6238D-02	.1613D-01	-.2684	.0	7.556	-.2142	19.92	.8543D-01
-2.290	1.168	-1.989	596.5	614.9	-14.96	2.835	-.3447

.2017	.2735	-.7248	1.749	1.842	-.1242	-.2529D-01	.1857D-01
2.235	2.474	-.7627	.3908D-01	.3517	.3944D-01	.4637D-01	.5305D-01
-.3730D-01	-.3481	.8885	-.5025D-01	-.4522	-.4733D-01	.1265D-01	-.7162D-01
-.5014	-.4227	1.023	.1117D-01	.1005	.2564D-01	.3794D-01	.1592D-01
.1289D-02	-.1906D-02	-.6661D-02	-.5363D-03	-.4918D-02	.1009D-01	.8943D-02	-.7803D-03
.1105D-02	.9946D-02	.3321D-02	.3722D-02	.2010D-01	.5916D-02	.5733D-01	.3183D-02
.5802D-02	.3978D-01	.6643D-02	.7816D-02	.7704D-01	.1262D-01	.1054	.1008D-01
-.5526D-02	-.4973D-01	-.7592D-02	-.8933D-02	-.8039D-01	-.1420D-01	-.1290	-.1273D-01
-50.00	-.1243D-01	39.46	.1861D-02	.1675D-01	.3944D-02	-.2108D-02	.2653D-02
-.6667	-.6668	.5846	.2481D-04	.2233D-03	.5259D-04	-.2810D-04	.3537D-04
-.4766D-01	-.4289	-47.85	-.7537D-01	-.6783	-.1262	-1.079	-.1074
-10.10	-10.04	38.95	-49.99	.1005	.1479D-01	.8431D-02	.2387D-01
-.4491	-.4461	1.731	-1.999	-1.996	.6705D-03	.3372D-03	.1061D-02
-4.618	-4.563	17.81	-2.906	-2.824	-19.77	.8431D-03	.1592D-01
.1381D-02	.1243D-01	.1352D-01	.1861D-02	.1675D-01	.7889D-03	-20.00	.2653D-02
.6658	1.144	-2.265	.8281D-01	.7788	25.80	25.83	-49.87

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THE B MATRIX
-.1209       19.83       -15.05       1.785        344.5
-.3014      -17.79       -4.207      -1.850        1319.
 .4824       67.86        12.47       10.66       -8161.
-.1031E-01  14.76         1.429       1.547        395.5
 .3319E-02-13.07          .7858E-01-.3799E-01-5.246
-.1496       28.76        2.667      -1.532        338.3
-.2155       58.93        6.955      -2.543        354.5
 .4266E-02-87.37        -11.11      -13.73        -21.22
 .2240      -4.230       -.3237      -.3959       -4489.
 .3331E-02-.6407E-01-.4791E-02-.5792E-02-66.55
 44.45      -734.8       -93.73      -88.93        .5605E+05
 .5230      -2.817       -.1276      -.3268       -5238.
 .2320E-01-.1280         -.5550E-02-.1452E-01-232.6
 .5038      -95.77        .3546      -.3349E-02-2852.
-.7895E-02  2.924        -.1907       .1601       -17.84
-.5664       256.8       -45.04       14.29        1614.

THE C MATRIX
-.1963E-01-.1332         5.781       96.23        102.0        1.900       -.2053       -.9314E-01
 .9121E-02 .4650E-03-.1022E-01-.4576E-03-.5770       -.7281E-02-.2308E-02-.1978E-04
 .0         .0           .0          .0           .0           .0           .0           .0
 .3900E-04 .4250E-04-.9384E-03-.6524E-04-.5285E-01-.6583E-03-.2116E-03-.1821E-05
 .1446E-03 .3871E-03-.2206E-01 .6479E-04 .5199E-01-.3879E-02 .2088E-03 .1799E-05
 .7446E-04-.7760E-05-.8661E-05-.1077E-03-.8979E-01 .3410E-04 .4157E-04-.2814E-05
 .2610E-04 .6958E-05-.1715E-03-.2905E-04-.2263E-01-.2148E-04 .4862E-04-.7118E-06

 .1033      .1538       -.3652       .8598E-02 .8006E-01 .6389        .6214        .1249E-01
-.1036E-04-.8547E-04-.1409E-04-.1628E-04-.1466E-03-.2712E-04-.2529E-03-.2487E-04
 .0         .0           1.000       .0           .0           .0           .0           .0
-.1113E-05-.9349E-05-.1410E-05-.1581E-05-.1468E-04-.2682E-05-.2358E-04-.2448E-05
 .1025E-05 .9015E-05 .1431E-05 .1640E-05 .1484E-04 .2691E-05 .2340E-04 .2435E-05
-.1720E-05-.1484E-04-.2354E-05-.2558E-05-.2351E-04-.4415F-05-.4061E-04-.3789E-05
-.4351E-06-.3855E-05-.6197E-06-.6861E-06-.6134E-05-.1136E-05-.1030E-04-.9715E-06

THE D MATRIX
-.5326E-01-47.26         .4677      -1.514        119.4
 .5668E-03-.1674         .1651       .6280E-02-1.021
 .0         .0           .0          .0           .0
 .6359E-04-.1384E-01-.1914E-02 .6030E-03-.1143
 .7321E-04 .1959E-01 .1942E-02-.6757E-03-.1386
 .6749E-04-.1791E-01 .2357F-03-.3748E-04-.1110
 .1908E-04-.4439E-02 .5070E-03 .1007F-03-.3442F-01
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F100 MODEL-1.8/75K,PLA=83,   GROUP 4 POINT 4-2/12/76 FAA

THE A MATRIX

-.6129	.1297	5.231	396.6	-613.0	-1.275	.7381D-01	-.6202D-01
-.1807	-.9388	123.3	-205.6	-27.81	5.239	.4201	-.4341D-01
.5947	.6054	-170.7	-44.54	210.3	-7.351	-.6018	.2171
.1349	.2655D-02	141.7	-549.5	100.1	-.3425	.3236	-.5272D-01
.9314D-03	-.1368D-02	.1116	1.945	-9.758	.1842D-01	.1194D-02	-.4603D-03
.8318	-.9118D-01	2.957	6.510	132.4	-18.85	.8062D-01	.3597D-01
.7314	-.2798	8.870	17.73	371.1	3.501	-19.78	.1073
-.7206	2.153	166.6	-19.53	-404.7	16.30	-.2498	-20.11
-.3676D-01	-.3983D-02	-1.421	-.2142	-20.03	.3875	.2839D-02	6.385
-.5463D-03	-.6069D-04	-.2123D-01	-.5711D-02	-.2967	.5728D-02	.3785D-04	.9458D-01
-6.855	-6.203	91.77	-190.2	-3862.	68.17	-2.362	35.89
-.9037D-01	-.4705	-476.0	1765.	-30.04	1.345	.1391	9.579
-.4008D-02	-.2091D-01	-21.15	78.45	-1.313	.5986D-01	.6245D-02	.4258
-.2293	-.2569	-214.7	250.0	1455.	1.252	.1647	4.422
.3652D-02	.1343D-01	-.9097D-01	.5140	8.233	-.1415	19.91	.8373D-01
-.7400	1.110	34.17	1091.	820.5	-10.08	1.380	.2884

.1341	.3741	-.4044	1.133	1.454	-.7264D-01	.8482D-01	.5825D-01
1.383	2.534	-.3232	.1889	1.700	.1964	.3958	.2767
-.2154	-1.955	.4288	-.2858	-2.572	-.2905	-.5429	-.4187
-.2097	.6461	.7536	.1392	1.253	.1560	.3336	.2075
.1455D-02	.4929D-02	-.3847D-02	.5667D-03	.5291D-02	.8335D-02	.9136D-02	.8500D-03
.2116D-01	.1972	.1364D-01	.2883D-01	.2595	.3766D-01	.9952D-01	.4223D-01
.6612D-01	.5645	.3898D-01	.8301D-01	.7470	.9470D-01	.2873	.1209
-.6612D-01	-.5713	-.4223D-01	-.8350D-01	-.7515	-.1087	-.3042	-.1223
-50.00	.3401D-01	39.56	.4970D-02	.4473D-01	.5381D-02	.1131D-01	.7282D-02
-.6666	-.6662	.5861	.6627D-04	.5964D-03	.7174D-04	.1508D-03	.9709D-04
-.6433	-5.509	-48.28	-.8077	-7.247	-1.075	-2.921	-1.180
-9.126	-8.587	38.63	-49.91	.7717	.9416D-01	.1527	.1256
-.4056	-.3816	1.717	-1.996	-1.966	.4197D-02	.6899D-02	.5607D-02
-4.136	-3.652	17.66	-3.170	-2.545	-19.58	.4071D-01	.1151
.7557D-03	.6802D-02	.1299D-01	.9941D-03	.8947D-02	.2690D-02	-19.99	.1456D-02
.9852	4.455	-1.925	.5629	5.066	25.56	27.15	-49.18

THE B MATRIX

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-.5152      -109.6     -16.52      4.841      496.3
-1.627      1.317      -1.783      -7.881     2802.
 2.641      29.90      11.32       15.74      -.1060E+05
-1.196      11.16      4.796       4.617      2126.
-.4516E-02-11.11       .1181       -.4361E-01 7.494
-.1536E-01 166.9       4.848       -2.921     333.3
-.6022      92.42      16.95       -9.074     1183.
 .6212      -77.76     -20.78      -8.812     -1280.
 .3760      -3.933     -.9772      -1.169     -6438.
 .5635E-02-.5545E-01-.1469E-01-.1741E-01-95.47
 62.94      -576.7     -201.8      -227.4      .6359E+05
 .5537      -14.23     -.9722      -2.387     -6064.
 .2439E-01-.6285       -.4256E-01-.1057       -269.1
 .1041      19.29      .7064       -2.198     -2065.
-.1900E-01-.5164       -.1801      .4781      43.84
-5.140      -88.96     -63.04      43.75      8147.
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THE C MATRIX

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-.8017E-01-.9197E-01 7.446      129.7      43.12      1.241      .8409E-01-.2744E-01
 .2613E-02 .1968E-04-.6397E-03-.1606E-02-.2781E-01-.2527E-03-.1774E-04-.7753E-05
 .0         .0         .0         .0         .0         .0         .0         .0
 .5933E-04 .3097E-04-.1012E-02-.2222E-02-.4520E-01-.3949E-03-.2772E-04-.1208E-04
 .1105E-03 .3259E-03-.2416E-01 .3077E-02 .6236E-01-.2172E-02 .3830E-04 .1683E-04
-.8666E-05-.5009E-05-.1030E-02-.5172E-02-.1037     -.3130E-04 .3246E-03-.2814E-04
-.4662E-05 .4523E-05-.3523E-03-.1299E-02-.2591E-01-.1474E-04 .1081E-03-.6996E-05

 .9873E-01 .3447      -.2542     .4048E-01 .3644      .5527      .5996      .5814E-01
-.4723E-05-.4251E-04-.3045E-05-.6213E-05-.5592E-04-.8407E-05-.2121E-04-.9102E-05
 .0         .0         1.000      .0         .0         .0         .0         .0
-.7476E-05-.6459E-04-.4933E-05-.9471E-05-.8524E-04-.1252E-04-.3406E-04-.1383E-04
 .1043E-04 .8897E-04 .6663E-05 .1310E-04 .1178E-03 .1739E-04 .4726E-04 .1907E-04
-.1760E-04-.1511E-03-.1156E-04-.2207E-04-.1987E-03-.2880E-04-.7839E-04-.3235E-04
-.4363E-05-.3757E-04-.2823E-05-.5479E-05-.4931E-04-.7179E-05-.1944E-04-.8044E-05
```

THE D MATRIX

```
-.3437      -.7477     -.2120      -2.889     496.1
 .6523E-03 .3554       .1486       .5795E-03 .7870
 .0         .0         .0          .0         .0
 .9706E-04 .4155E-02-.5219E-02 .9970E-03-.1003
-.1160E-03 .6164E-02 .3378E-02 .1477E-02 .2334
 .2034E-03-.3205E-02-.3650E-03-.4085E-03-.2863
 .5139E-04 .1500E-03 .5215E-03 .1002E-03-.6751E-01
```

F100 MODEL-1.8/20K,PLA=83,   GROUP 4 POINT 5-2/12/76 FAA

THE A MATRIX

-7.944	1.403	7.642	434.0	-568.2	-9.167	.6154	.3167
-2.225	-4.913	123.2	-179.3	33.28	17.63	5.740	1.037
8.756	5.166	-183.4	-84.85	142.0	-69.69	-4.907	-.1296
1.630	-.2293	139.1	-556.2	81.46	-2.463	3.253	-.9847
.2358D-01	-.9961D-02	.1506	2.059	-9.532	.1677	.8863D-02	.4828D-02
.8499	-.8529D-01	.5699	.5917	18.94	-18.77	.4406	.7716D-01
.5476	-.1752	.9963	.9885	32.07	2.278	-19.26	.1261
-1.099	.6086	17.32	-1.313	-42.64	26.81	-.9939	-20.17
-.4955D-01	.1662D-02	.8963D-01	.5411D-01	-1.600	.2894	-.3878D-01	5.848
-.7324D-03	.2462D-04	.1321D-02	.7215D-03	-.2377D-01	.4302D-02	-.5516D-03	.8665D-01
-8.049	-4.376	10.03	-9.795	-312.9	45.42	-7.263	37.49
-.5937D-01	-.3286	-40.80	152.0	-.4571D-01	.6351	.1112	8.911
-.2636D-02	-.1461D-01	-1.813	6.756	-.1828D-02	.2827D-01	.4964D-02	.3961
-.1554	-.2284	-18.44	16.86	118.4	1.062	-.4137D-01	4.100
.1963D-02	.9600D-02	-.2076D-01	.2886D-01	.7680	-.9833D-01	19.92	.7889D-01
-1.194	.7798	3.897	89.15	92.52	-4.760	3.103	.7486

2.488	10.89	-4.637	14.50	25.50	1.075	1.535	1.982
17.98	39.81	-3.080	3.628	32.72	3.994	6.935	5.182
-4.063	-36.23	4.176	-5.337	-48.04	-6.047	-9.134	-7.602
-3.018	4.788	8.791	1.295	11.73	1.340	2.792	1.855
.2365D-01	.1085	-.4148D-01	.1437D-01	.1226	.1059	.1147	.2045D-01
.4666D-01	.4368	.4744D-01	.6440D-01	.5796	.5629D-01	.2308	.9255D-01
.7540D-01	.7055	.7648D-01	.1035	.9318	.9114D-01	.3740	.1484
-.1056	-.9877	-.1055	-.1456	-1.311	-.1260	-.5204	-.2077
-50.00	-.3360D-01	3[illegible].85	-.4954D-02	-.4458D-01	.5361D-02	-.1803D-01	-.7065D-02
-.6667	-.6671	.550[illegible]	-.6605D-04	-.5944D-03	.8935D-04	-.2748D-03	-.9420D-04
-.7671	-7.190	-48.[illegible]9	-1.063	-9.563	-.9302	-3.797	-1.524
-9.733	-9.222	39[illegible]1	-49.92	.6576	.1086	.1674	.9891D-01
-.4326	-.4099	1[illegible]38	-1.996	-1.971	.4825D-02	.7419D-02	.4380D-02
-4.463	-4.169	[illegible].93	-3.246	-2.867	-19.80	.2298	.6147D-01
.1866D-02	.1680D-01	[illegible]323D-01	.2477D-02	.2229D-01	.1072D-02	-19.99	.3533D-02
1.261	7.148	-[illegible].449	.9759	8.783	25.85	27.79	-48.61

THE B MATRIX

-1.119	734.3	-189.0	160.5	.1918E+05
-2.643	1058.	-16.12	-190.1	.5612E+05
4.010	-1693.	154.9	367.5	-.1560E+06
-.9272	407.9	39.16	87.70	.2377E+05
-.1023E-01	-132.1	1.272	-.8519	173.2
-.5238E-01	7.528	8.613	-7.997	1212.
-.7756E-01	2.669	15.45	-16.50	2120.
.1075	-21.43	-27.78	-19.01	-2655.
.3384E-01	1.122	-1.266	-2.982	-5709.
.4986E-03	.1689E-01	-.1863E-01	-.4397E-01	-84.62
5.587	-345.8	-205.9	-466.7	.5094E+05
.4532E-01	17.14	-.5934	-1.949	-5203.
.2014E-02	.7633	-.2621E-01	-.8667E-01	-231.4
.4474E-01	-35.25	1.707	-8.106	-2393.
-.2036E-02	.6067	-.9820E-01	1.003	61.66
-.7315	344.7	-43.52	93.26	.1618E+05

THE C MATRIX

-1.100	-.7299	10.32	137.7	64.71	12.13	.9407	.3303
.4606E-01	.1038E-02	-.6982E-02	-.6494E-02	-.2560	-.1664E-01	-.5585E-02	-.8638E-03
.0	.0	.0	.0	.0	.0	.0	.0
.1327E-03	.2335E-04	-.1463E-03	-.1506E-03	-.4999E-02	-.3240E-03	-.1145E-03	-.1949E-04
.1286E-03	.2724E-03	-.2020E-02	.1563E-03	.5006E-02	-.1649E-02	.1163E-03	.2027E-04
-.1422E-05	-.7563E-05	-.1387E-03	-.3602E-03	-.1164E-01	-.5169E-04	.1458E-03	-.4670E-04
.4919E-06	.2367E-05	-.4734E-04	-.8684E-04	-.2840E-02	-.4489E-05	.6174E-04	-.1128E-04

1.602	7.582	-2.717	.9907	8.948	7.058	7.785	1.409
-.5226E-03	-.4871E-02	-.5486E-03	-.7430E-03	-.6687E-02	-.6433E-03	-.2679E-02	-.1060E-02
.0	.0	1.000	.0	.0	.0	.0	.0
-.1180E-04	-.1105E-03	-.1202E-04	-.1644E-04	-.1479E-03	-.1425E-04	-.5854E-04	-.2354E-04
.1228E-04	.1146E-03	.1250E-04	.1699E-04	.1529E-03	.1488E-04	.6069E-04	.2439E-04
-.2834E-04	-.2646E-03	-.2869E-04	-.3959E-04	-.3563E-03	-.3421E-04	-.1398E-03	-.5633E-04
-.6826E-05	-.6398E-04	-.6973E-05	-.9548E-05	-.8593E-04	-.8194E-05	-.3387E-04	-.1360E-04

THE D MATRIX

-.7177	293.8	-7.413	-60.78	.1299E+05
.6579E-03	-.1564	1.591	.1051	-17.88
.0	.0	.0	.0	.0
.1271E-04	-.4393E-02	-.5287E-03	.2214E-02	-.3415
-.1335E-04	.5211E-02	.3275E-02	.5572E-02	.3194
.3135E-04	-.1313E-02	-.1011E-02	-.1346E-02	-.7602
.7488E-05	-.3030E-03	.2613E-03	.1093E-03	-.1855

F100 MODEL-0.3/20K,PLA=83,   GROUP 4 POINT 6-2/12/76 FAA

THE A MATRIX

-2.366	.5959D-01	1.601	400.5	-828.6	-2.777	.7029D-01	-1.131
-.4408	-3.050	116.9	-275.6	-519.6	11.70	-1.603	-2.880
1.030	3.300	-136.3	78.75	1207.	-39.50	2.980	5.949
.9486D-01	-.2113	116.8	-591.6	17.40	-7.933	-3.269	-2.628
.4308D-02	-.7050D-02	.5890D-01	1.585	-9.317	.1044	-.1569D-02	-.1032D-01
.8276	.7213D-02	1.261	3.532	90.09	-19.53	.1448	.1543
.7108	.3756D-01	4.503	15.85	235.5	1.930	-19.75	.6479
-.1825	.7966	27.97	-10.93	-214.6	29.79	-.2263	-20.45
-.1348D-01	-.1529D-01	.1251D-01	-.8499	-17.29	.6108	-.2460D-01	6.760
-.2030D-03	-.2274D-03	.1668D-03	-.1259D-01	-.2577	.9043D-02	-.3749D-03	.1001
-2.130	-6.880	6.016	-128.1	-2708.	98.49	-2.706	31.18
-.4967D-01	-.4600	-98.60	362.4	-56.51	1.832	-.1511	9.843
-.2207D-02	-.2045D-01	-4.382	16.11	-2.513	.8139D-01	-.6748D-02	.4375
-.1786	-.2460	-45.22	35.30	273.4	1.382	-.5905D-01	4.515
-.8687D-02	.3183D-01	-.3002D-01	.6043	12.43	-.4389	19.85	.1550
-1.423	1.947	6.592	253.4	743.4	-26.05	1.265	1.268

.2730	-2.164	-2.538	4.897	1.660	-.8302	-1.192	-.5648
5.447	-1.302	-2.951	-1.118	-10.08	-1.203	-3.089	-1.548
1.793	16.30	4.548	2.406	21.68	2.578	6.715	3.325
-2.412	-9.223	2.428	-1.129	-10.16	-1.209	-2.845	-1.556
.1994D-02	-.2116D-01	-.2165D-01	-.3584D-02	-.3367D-01	.2614D-01	.8171D-02	-.5354D-02
.8515D-01	.8214	.8506D-01	.1177	1.060	.1247	.3682	.1623
.3679	3.370	.3221	.4943	4.448	.5313	1.376	.6815
-.2534	-2.336	-.2315	-.3413	-3.071	-.3682	-.9957	-.4705
-50.02	-.2109	39.32	-.3120D-01	-.2808	-.3204D-01	-.6973D-01	-.4301D-01
-.6670	-.6698	.5826	-.4702D-03	-.4232D-02	-.4855D-03	-.1069D-02	-.6483D-03
-2.988	-27.25	-50.36	-4.020	-36.22	-4.310	-11.59	-5.554
-9.738	-10.50	38.32	-50.13	-1.147	-.1209	-.3242	-.1758
-.4328	-.4664	1.703	-2.006	-2.051	-.5418D-02	-.1450D-01	-.7855D-02
-4.485	-4.873	17.62	-3.228	-3.770	-19.83	-.1883	-.8827D-01
.1426D-01	.1283	.3347D-01	.1899D-01	.1709	.2039D-01	-19.95	.2618D-01
1.583	9.562	-1.500	1.329	11.87	32.46	23.41	-48.18

THE B MATRIX

.7934	-93.53	-63.66	-2.432	-3188.
2.436	363.4	-21.08	-39.38	-8978.
-4.884	-992.6	46.77	44.99	-9337.
2.534	448.1	-18.17	-9.318	-.1103E+05
.7860E-02	-46.99	.2394	-.7650E-01	-27.47
-.2620	6.058	11.92	.8290	1271.
-1.012	-131.4	18.52	4.368	4407.
.6272	212.9	-7.213	7.310	-2649.
.1474	20.40	-.5989	-.5679	-6755.
.2199E-02	.3037	-.9056E-02	-.8533E-02	-100.2
20.37	1769.	-82.23	-86.22	.4164E+05
.5067	74.67	-2.410	-2.184	-8096.
.2256E-01	3.330	-.1074	-.9720E-01	-359.9
.2808	81.12	-.8214	-1.306	-3497.
-.3966E-01	-8.202	-.4319	.4270	163.0
-2.714	-662.1	-59.88	27.04	.1402E+05

THE C MATRIX

.1697	-.3705	4.127	93.52	-7.016	5.851	.1023	-.4717
.7981E-02	.0	-.3283E-03	-.8263E-03	-.2190E-01	-.1243E-03	.0	-.3112E-04
.0	.0	.0	.0	.0	.0	.0	.0
.1863E-03	-.1716E-05	-.5150E-03	-.1651E-02	-.3580E-01	-.2352E-03	-.3393E-04	-.6793E-04
.3005E-04	.1298E-03	-.4556E-02	.1807E-02	.3801E-01	-.1129E-02	.3786E-04	.7455E-04
.6022E-05	-.3412E-04	-.2613E-03	-.1562E-02	-.3314E-01	.3407E-03	.9372E-04	-.6403E-04
.6866E-05	.3111E-05	-.1456E-03	-.3951E-03	-.8455E-02	.2098E-05	.4730E-04	-.1609E-04

.1835	-.5750	-1.174	-.1315	-1.168	1.779	.8189	-.1753
-.1783E-04	-.1604E-03	-.2288E-04	-.2374E-04	-.2136E-03	-.2549E-04	-.9152E-04	-.3273E-04
.0	.0	1.000	.0	.0	.0	.0	.0
-.3840E-04	-.3508E-03	-.3523E-04	-.5182E-04	-.4661E-03	-.5543E-04	-.1500E-03	-.7148E-04
.4224E-04	.3857E-03	.3837E-04	.5687E-04	.5117E-03	.6082E-04	.1635E-03	.7847E-04
-.3621E-04	-.3302E-03	-.3295E-04	-.4885E-04	-.4389E-03	-.5234E-04	-.1414E-03	-.6713E-04
-.9097E-05	-.8299E-04	-.8333E-05	-.1227E-04	-.1110E-03	-.1323E-04	-.3560E-04	-.1692E-04

THE D MATRIX

.2501	-9.897	10.89	-4.037	-803.4
.2901E-03	.3904	.3523	-.1251E-03	-.1488
.0	.0	.0	.0	.0
.1203E-03	.2704E-01	.3050E-02	-.4161E-03	-.5481
-.1111E-03	-.2203E-01	.1161E-02	-.7522E-03	.5033
.1044E-03	.3351E-01	.3979E-03	-.6694E-03	-.4807
.2735E-04	.1035E-01	.3364E-03	-.7020E-04	-.1277

F100 MODEL-1.8/40K,PLA=83.   GROUP 4 POINT 7-2/12/76 PAA

THE A MATRIX

-2.939	.9750	5.259	409.8	-558.0	-8.824	-.7726	-.8533D-01
-.8650	-3.729	132.6	-177.6	57.68	19.96	2.551	.7406
2.989	3.596	-185.6	-90.11	6.735	-48.44	-1.721	-.5760
.9305	.1580	146.4	-527.2	140.2	-.2428	4.204	.6522
.2720D-02	-.1114D-01	-.2729D-01	1.395	-9.689	.6304D-01	-.5038D-01	-.2540D-01
.6581	-.1731	1.014	.6017	20.72	-17.87	.5124	.2743D-01
.5296	-.3489	1.900	1.132	37.16	4.039	-19.08	.5059D-01
-.6764	1.002	29.07	-1.375	-45.07	25.22	-1.117	-20.06
-.4054D-01	-.1376D-01	.1037	-.2149	-2.936	.4234	-.7101D-01	6.214
-.6002D-03	-.2033D-03	.1508D-02	-.3343D-02	-.4375D-01	.6285D-02	-.1060D-02	.9206D-01
-6.205	-6.380	25.08	-12.79	-414.5	70.31	-10.30	36.95
-.8037D-01	-.4092	-78.89	298.2	1.468	1.358	.1193	9.396
-.3573D-02	-.1818D-01	-3.506	13.26	.6562D-01	.6041D-01	.5340D-02	.4176
-.1851	-.2367	-35.72	37.20	251.2	1.320	.3749D-01	4.351
.1980D-02	.1733D-01	-.6409D-01	.4298D-01	1.312	-.1840	19.92	.9387D-01
-.9508	1.311	4.533	186.4	130.0	-11.43	3.599	.3733

1.032	3.815	-2.441	6.787	10.58	-.2665D-02	1.006	.6991
9.083	20.85	-1.442	1.949	17.63	2.073	4.285	2.743
-2.350	-21.08	1.752	-3.112	-28.01	-3.315	-6.745	-4.413
-.6977	9.267	5.017	1.648	14.86	1.775	3.669	2.270
-.5355D-02	-.9985D-01	-.3544D-01	-.1559D-01	-.1390	.2736D-01	.3674D-02	-.2200D-01
.1688D-01	.1688	.1647D-01	.2237D-01	.2014	.2665D-01	.8028D-01	.3178D-01
.3151D-01	.2802	.2842D-01	.4127D-01	.3714	.4690D-01	.1447	.5861D-01
-.3788D-01	-.3511	-.3617D-01	-.5022D-01	-.4519	-.5542D-01	-.1775	-.7132D-01
-50.00	.8440D-02	39.64	.1243D-02	-.5593D-01	-.5329D-02	-.1696D-01	.1765D-02
-.6667	-.6666	.5873	.1657D-04	-.7458D-03	-.7106D-04	-.2261D-03	.2354D-04
-.3470	-3.207	-48.27	-.4661	-4.195	-.5343	-1.625	-.6708
-9.541	-8.913	38.81	-49.90	.7495	.1092	.2572	.1659
-.4240	-.3960	1.725	-1.995	-1.966	.4903D-02	.1153D-01	.7414D-02
-4.356	-3.859	17.83	-3.031	-2.492	-19.67	.1798	.1186
.1125D-02	.1350D-01	.1485D-01	.1989D-02	.1342D-01	.2132D-02	-19.99	.2825D-02
1.065	5.030	-1.868	.6662	5.996	27.50	25.28	-49.04

THE B MATRIX

-.9025	-647.5	-90.64	19.65	5556.
-2.926	150.0	1.202	13.72	.3087E+05
4.899	-89.85	48.83	-1.507	-.8764E+05
-2.388	256.0	43.80	31.94	.2525E+05
.2378E-01	-63.57	.1790	-.3783	-207.1
.4326E-01	179.8	5.893	-2.037	352.6
-.3781E-01	72.16	17.09	-4.035	594.8
.3817E-01	-75.92	-22.07	-9.422	-791.1
.7334E-01	-3.296	-1.403	-.6251	-6333.
.1086E-02	-.5032E-01	-.2074E-01	-.9157E-02	-93.86
9.786	-684.1	-203.7	-92.83	.6831E+05
.5895E-01	6.582	-1.118	.2744	-5196.
.2595E-02	.2972	-.4939E-01	.1244E-01	-230.9
-.2514E-01	78.83	1.339	-.2372	-1048.
-.3160E-02	.7166	-.1930	.2608	22.59
-1.038	16.55	-58.23	26.50	.1040E+05

THE C MATRIX

-.4135	-.5953	8.176	133.7	32.60	7.677	-.4445	-.1663
.1549E-01	.4367E-03	-.3570E-02	-.2238E-02	-.7361E-01	-.7590E-02	-.1814E-02	-.9524E-04
.0	.0	.0	.0	.0	.0	.0	.0
.5290E-04	.4328E-04	-.2427E-03	-.1518E-03	-.4990E-02	-.5142E-03	-.1236E-03	-.6749E-05
.9256E-04	.2839E-03	-.3929E-02	.1878E-03	.6179E-02	-.2045E-02	.1536E-03	.8438E-05
.2064E-04	.1018E-04	-.1312E-03	-.2894E-03	-.9520E-02	-.1530E-03	.4897E-04	-.1272E-04
.2944E-05	.1207E-04	-.7598E-04	-.7292E-04	-.2439E-02	-.7404E-04	.3778E-04	-.3304E-05
.5986	1.939	-1.585	.2247	2.008	3.315	3.187	.3333
-.5861E-04	-.5592E-03	-.5853E-04	-.7769E-04	-.6992E-03	-.8827E-04	-.2791E-03	-.1103E-03
.0	.0	1.000	.0	.0	.0	.0	.0
-.4130E-05	-.3824E-04	-.3969E-05	-.5505E-05	-.4954E-04	-.6317E-05	-.1923E-04	-.7818E-05
.5082E-05	.4711E-04	.4979E-05	.6895E-05	.6145E-04	.7774E-05	.2391E-04	.9792E-05
-.7917E-05	-.7410E-04	-.7470E-05	-.1038E-04	-.9341E-04	-.1220E-04	-.3631E-04	-.1474E-04
-.2033E-05	-.1904E-04	-.1924E-05	-.2695E-05	-.2425E-04	-.3188E-05	-.9179E-05	-.3827E-05

THE D MATRIX

-.3447	180.9	-3.201	-4.973	3482.
.1040E-02	1.535	.7789	.4907E-02	2.387
.0	.0	.0	.0	.0
.1108E-04	.1708E-02	-.6347E-02	.4994E-03	-.6890E-01
-.4034E-05	.1034E-01	.2984E-02	-.8385E-03	.8543E-01
.1621E-04	-.4016E-02	-.9989E-03	-.2185E-04	-.1432
.4584E-05	-.1027E-03	.3452E-03	.1199E-03	-.3398E-01

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THE A MATRIX

-2.355	.6569	6.702	458.8	-494.3	-4.796	-.7604	.1093
-.7475	-1.913	109.7	-239.9	-18.21	8.043	-1.131	-.8014
2.497	2.318	-152.2	27.52	62.75	-18.26	3.873	1.723
-.3825D-01	-.2974	103.0	-709.0	-214.6	-4.637	-3.061	-2.452
.7614D-02	-.3801D-02	.1606	2.187	-8.300	.4820D-01	-.4711D-02	.2008D-02
.7954	-.1392	2.407	4.586	10.46	-18.43	.6387	.7566D-01
.9709	-.4738	5.468	6.999	15.96	4.485	-18.49	.1154
-1.222	.7225	68.99	-13.90	-31.68	23.90	-1.929	-20.23
-.4265D-01	-.9550D-02	.6614D-01	-.8493	-1.937	.3079	-.8079D-01	5.496
-.6307D-03	-.1398D-03	.1176D-02	-.1246D-01	-.2841D-01	.4572D-02	-.1172D-02	.8143D-01
-8.379	-7.246	29.54	-94.19	-214.8	62.01	-13.10	38.55
.1861D-01	-.3326	-189.0	685.5	.5810	-.8864D-01	-.9505D-02	8.396
.8271D-03	-.1478D-01	-8.400	30.47	.3099D-01	-.3919D-02	-.3802D-03	.3732
-.1223	-.2624	-84.57	61.83	562.8	1.134	-.1568	3.888
.1654D-02	.1296D-01	-.1764D-01	.3058	.6972	-.1017	19.95	.7005D-01
-1.234	.9645	26.04	415.0	142.3	-4.437	4.622	1.101
.5368	2.564	-.9156	2.983	5.604	.9991D-01	.5403	.4567
3.199	2.459	-1.271	-.1204	-1.084	-.1269	-.2227	-.1686
.3139	2.826	1.932	.4177	3.759	.4374	.7678	.5656
-2.194	-12.89	.5386	-1.760	-15.87	-1.839	-3.265	-2.424
.5832D-02	.3069D-01	-.8423D-02	.4115D-02	.3718D-01	.2358D-01	.3039D-01	.5479D-02
.5232D-01	.4710	.4544D-01	.6919D-01	.6227	.7291D-01	.1280	.9485D-01
.8061D-01	.7186	.7035D-01	.1071	.9640	.1112	.1953	.1468
-.1585	-1.427	-.1367	-.2096	-1.887	-.2209	-.3877	-.2853
-50.01	-.8721D-01	40.03	-.1281D-01	-.1153	-.1350D-01	-.2370D-01	-.1756D-01
-.6668	-.6679	.5930	-.1879D-03	-.1691D-02	-.1980D-03	-.3476D-03	-.2576D-03
-1.075	-9.672	-49.25	-1.425	-12.82	-1.497	-2.628	-1.948
-9.722	-9.628	39.38	-50.00	-.1153D-01	.4050D-02	.7109D-02	.1581D-01
-.4321	-.4277	1.750	-2.000	-2.000	.2160D-03	.3791D-03	.7026D-03
-4.403	-4.096	18.00	-2.748	-2.362	-19.69	.1687	.7166D-01
.3488D-02	.3140D-01	.1212D-01	.4100D-02	.3690D-01	.4860D-02	-19.99	.5621D-02
1.463	9.297	-1.069	1.295	11.66	24.36	29.59	-48.21

THE B MATRIX

-1.103	32.56	-25.12	35.31	3984.
.1775	-85.14	-10.24	-55.26	1379.
-1.120	139.0	35.13	111.5	-.1429E+05
5.965	-376.5	-11.56	-19.80	-.1968E+05
-.1422E-01	-31.01	.1688	-.1572	51.49
-.2482	12.02	2.422	-6.660	869.3
-.3707	13.45	12.46	-22.52	1209.
.8895	9.449	-16.99	-21.68	-3539.
.1756	-5.236	-.6340	-2.053	-4914.
.2589E-02	-.8054E-01	-.9374E-02	-.3037E-01	-72.69
26.13	-484.5	-117.3	-374.4	.4849E+05
.4024	-65.17	-.9653	-6.093	-5670.
.1783E-01	-2.886	-.4372E-01	-.2706	-251.6
.8401E-01	17.24	.3888	-8.113	-1834.
-.1381E-01	.9814	.4349E-02	.6756	58.24
-4.216	294.1	-15.62	58.04	.1603E+05

THE C MATRIX

-.4091	-.3646	13.01	163.1	175.1	4.439	-.9885E-02	.1789
.1289E-01	.1116E-02	-.1805E-01	-.3419E-01	-.7795E-01	-.1177E-01	-.4782E-02	-.5639E-03
.0	.0	.0	.0	.0	.0	.0	.0
-.1256E-04	.5478E-04	-.8825E-03	-.1678E-02	-.3827E-02	-.5808E-03	-.2345E-03	-.2769E-04
.1368E-03	.1355E-03	-.8094E-02	.1534E-02	.3499E-02	-.7152E-03	.2134E-03	.2531E-04
-.2444E-04	.3544E-04	-.1614E-02	-.4844E-02	-.1105E-01	-.5454E-03	-.2348E-03	-.7990E-04
-.1628E-05	.1088E-04	-.3971E-03	-.1136E-02	-.2591E-02	-.1139E-03	-.2727E-04	-.1874E-04

.4632	2.531	-.5911	.3378	3.044	1.747	2.276	.4699
-.3973E-03	-.3510E-02	-.3450E-03	-.5253E-03	-.4728E-02	-.5434E-03	-.9538E-03	-.7202E-03
.0	.0	1.000	.0	.0	.0	.0	.0
-.1926E-04	-.1723E-03	-.1675E-04	-.2551E-04	-.2296E-03	-.2668E-04	-.4683E-04	-.3497E-04
.1750E-04	.1576E-03	.1518E-04	.2321E-04	.2089E-03	.2439E-04	.4281E-04	.3171E-04
-.5564E-04	-.4974E-03	-.4833E-04	-.7359E-04	-.6623E-03	-.7700E-04	-.1351E-03	-.1009E-03
-.1303E-04	-.1167E-03	-.1132E-04	-.1724E-04	-.1552E-03	-.1806E-04	-.3170E-04	-.2364E-04

THE D MATRIX

-1.162	89.02	-3.051	-15.71	4239.
.1827E-02	.9726E-02	.2038	.5040E-01	-5.876
.0	.0	.0	.0	.0
.8838E-04	-.4150E-02	-.3380E-02	.2537E-02	-.3309
-.7088E-04	.7438E-02	.1922E-02	-.3658E-02	.2620
.2465E-03	-.1512E-01	-.1729E-02	.1164E-02	-.8691
.5792E-04	-.3416E-02	-.8929E-04	.3993E-03	-.2036

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THE A MATRIX

-1.847	.2042	.3440	412.1	-679.5	-2.847	-.9848	-.4657
-.7525	-1.475	99.91	-272.0	-151.9	1.846	-1.619	-1.482
2.250	1.642	-146.6	52.33	357.7	-13.61	3.106	2.533
.3029	-.1231	133.0	-605.9	57.75	-1.654	-.8905D-01	-.8025
.3481D-02	-.4848D-02	-.1285	1.126	-11.03	.4693D-02	-.3496D-01	-.1951D-01
.5983	-.7723D-01	.7644D-01	-2.216	37.73	-19.23	.1362	-.5799D-01
.5633	-.2252	.5962	-4.664	92.66	2.127	-19.64	-.1236
-.8500	.6946	69.80	5.306	-88.79	27.11	-.3237	-19.87
-.3929D-01	.3906D-02	.2866	.7288D-01	-4.594	.3085	-.1048D-01	5.989
-.5835D-03	.5704D-04	.4077D-02	.9717D-03	-.6781D-01	.4563D-02	-.1746D-03	.8872D-01
-6.684	-4.278	60.10	41.76	-699.7	52.95	-2.559	39.31
-.8405D-01	-.4025	-165.1	606.3	-17.72	.4252	-.2122	8.943
-.3740D-02	-.1789D-01	-7.339	26.95	-.7875	.1887D-01	-.9429D-02	.3974
-.2326	-.2181	-75.55	55.07	482.5	.4262	-.2064	4.013
-.2288D-02	.9077D-02	-.1376	-.2041	2.100	-.1151	19.90	.7615D-01
-1.928	.5195	-10.09	294.5	67.76	-8.957	-.5867	-1.432

.1705	-.8430	-1.305	2.805	1.359	-.4901	-.3548	-.2319
3.259	-.2529	-1.706	-.5817	-5.146	-.6256	-1.258	-.8135
.6350	5.733	2.392	.8317	7.552	.9150	1.931	1.167
-1.056	-1.888	1.840	-.1312	-.9357	-.1069	-.2139	-.1869
-.7327D-02	-.9077D-01	-.2157D-01	-.1380D-01	-.1254	.7039D-02	-.8419D-02	-.1936D-01
-.3447D-01	-.3069	-.3493D-01	-.4703D-01	-.4099	-.4379D-01	-.6992D-01	-.6578D-01
-.7568D-01	-.6778	-.7537D-01	-.1020	-.9045	-.9280D-01	-.1440	-.1426
.8355D-01	.7520	.8281D-01	.1139	.9936	.1022	.1670	.1592
-49.99	.3372D-01	39.78	.4951D-02	.1003	.2607D-02	.1044D-01	.6924D-02
-.6665	-.6662	.5893	.6601D-04	.1485D-02	.3476D-04	.1391D-03	.9232D-04
.6566	5.867	-47.41	.8899	7.809	.8172	1.302	1.245
-9.553	-9.948	38.89	-50.06	-.6572	-.4562D-01	-.1774	-.7789D-01
-.4246	-.4421	1.728	-2.002	-2.029	-.2033D-02	-.7932D-02	-.3462D-02
-4.379	-4.805	17.68	-2.879	-3.462	-19.79	-.2505	-.9070D-01
-.2248D-02	-.2023D-01	.9057D-02	-.2970D-02	-.2673D-01	-.3649D-02	-20.01	-.4847D-02
-.9272D-01	-5.159	-2.810	-.8503	-7.864	24.37	23.36	-51.19

THE B MATRIX

.3011	-401.4	-43.70	20.74	-1435.
1.769	-245.0	-19.22	-97.98	-4527.
-2.291	493.4	51.01	167.2	-.1301E+05
.4350	-5.350	2.326	9.699	-112.4
.4196E-01	-36.28	.8414E-01	-.6851	-126.9
.1689	45.18	3.796	-9.292	-361.9
.3891	115.1	14.73	-25.77	-1197.
-.4185	-74.00	-16.18	-10.30	1245.
.1164	-5.640	-.7725	-2.638	-5845.
.1738E-02	-.8002E-01	-.1150E-01	-.3903E-01	-86.69
16.11	-740.0	-128.5	-458.8	.8058E+05
.5383	-44.03	-2.105	-7.912	-6706.
.2395E-01	-1.952	-.9371E-01	-.3522	-298.0
.4208	43.90	-2.161	-8.175	-3187.
.8513E-02	.3625	-.2145	.9491	-26.99
2.415	-274.2	-66.44	47.20	-6921.

THE C MATRIX

-.3753	-.2777	1.859	118.8	.5250E-01	2.180	-.8901	-.5600
.1169E-01	.6857E-03	-.6211E-03	.1649E-01	-.3105	-.6410E-02	-.1120E-02	.4741E-03
.0	.0	.0	.0	.0	.0	.0	.0
.5298E-05	.2617E-04	-.2445E-04	.7060E-03	-.1188E-01	-.2450E-03	-.4312E-04	.1815E-04
.1106E-03	.2784E-03	-.8650E-02	-.6977E-03	.1158E-01	-.1854E-02	.4221E-04	-.1787E-04
.2713E-04	.7328E-05	.4532E-03	.1505E-02	-.2513E-01	.3694E-04	.2385E-03	.3824E-04
.1006E-04	.5421E-05	.7185E-04	.3744E-03	-.6211E-02	.2117E-04	.8367E-04	.9531E-05

.8991E-03	-1.735	-1.063	-.2864	-2.652	1.219	.8741	-.3999
.2903E-03	.2592E-02	.2861E-03	.3914E-03	.3467E-02	.3633E-03	.5740E-03	.5452E-03
.0	.0	1.000	.0	.0	.0	.0	.0
.1112E-04	.9941E-04	.1096E-04	.1502E-04	.1327E-03	.1389E-04	.2215E-04	.2100E-04
-.1094E-04	-.9711E-04	-.1077E-04	-.1472E-04	-.1297E-03	-.1360E-04	-.2152E-04	-.2061E-04
.2357E-04	.2093E-03	.2306E-04	.3172E-04	.2811E-03	.2915E-04	.4660E-04	.4436E-04
.5854E-05	.5154E-04	.5698E-05	.7856E-05	.6962E-04	.7274E-05	.1136E-04	.1099E-04

THE D MATRIX

.8550	107.6	-8.041	-33.86	-2761.
-.2046E-03	1.255	.3325	.7409E-01	4.892
.0	.0	.0	.0	.0
-.4208E-04	.3407E-02	-.1999E-02	.3001E-02	.1608
.5071E-04	.1200E-01	.2120E-02	.5151E-02	-.1149
-.9186E-04	.1594E-02	.1085E-03	.1095E-02	.3162
-.2162E-04	.2160E-02	.4822E-03	.6632E-03	.7924E-01

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